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In This Issue:

The Cape Cod Lift Bridge

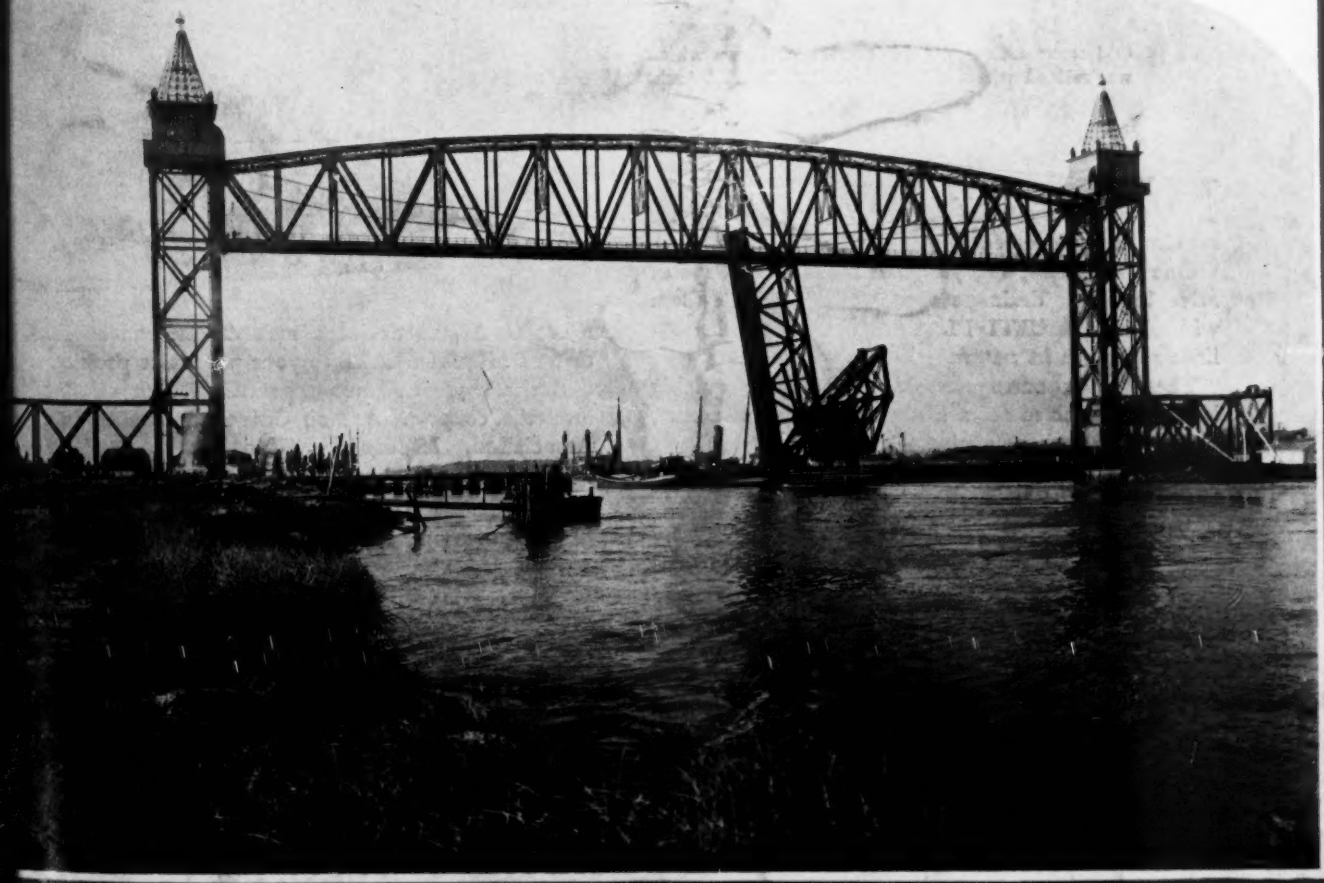
Milwaukee Sewage Plant Extension

Getting Results on a Relief Works Project

Soil Control in Dam Construction

Road Builders Convention and Equipment Report

Spanning 544 ft., a new record length for vertical lift spans, the Buzzards Bay railroad bridge replaces a 160 ft. bascule made obsolete by the plans to widen the Cape Cod Canal to 500 ft.



Another Relining Job

THAT SAVED MONEY

Old stone arch under 20-foot fill in Kansas which was relined with an Armco MULTI PLATE Arch.

MANY of the old arch culverts have served their purpose well, but are today in need of major repairs or replacement.

One of the simplest, yet most satisfactory ways of salvaging these drainage openings is to reline them with Armco MULTI PLATE. There need be but little reduction in waterway area.

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FOR ECONOMICAL DRAINAGE

A MOMENT WITH THE PUBLISHERS

To Make Learning More Useful—I

FROM the newspapers we learn that Thomas W. Lamont has given $500,000 to endow a Harvard professorship. However interesting the donation itself may be to Harvard, two incidental features are of greater significance to the rest of us.

One of these is the provision that the new chair be the first of an entirely new type of interdepartmental professorship designed to coordinate the work of specialists. The other is the donor's definition of the field of political economy, in which he prefers to see his donation applied.

In his letter apprising President Conant of his gift, Mr. Lamont says, "this vital subject (political economy) has to do, I take it, with the fundamental principles that govern human affairs, as they concern the state and as they concern individuals. Political economy concerns itself as much with the behavior of man as a social animal as it does with any known laws of industry and trade and agriculture and finance."

A FEW economists recognize the truth of that statement, but they are too few. And until that conception becomes the basis of all economic teaching and practice we shall continue to waste the time of undergraduates on so-called economics and we shall still find the average man amazingly indifferent to the principles that govern the standard and security of his existence. Mr. Lamont's "behavior of man as a social animal" is the motive power behind every economic process and in developing economic principle we may as well take it into the equation at the start.

Closely related to this conception is the recognition implied by the new professorship that the universal and humanitarian nature of political economy demands a more effective coordination of specialized knowledge. It becomes more and more manifest, for example, that many of our social and economic difficulties result from a failure to coordinate the social sciences with our amazing progress in the physical sciences.

Specialization of functions is essential to our modern economy; without it man never could have achieved the material progress of the last century. But it tends to drive each group of specialists ever outward from the hub of common understanding along its respective interest. And the farther each advances at its own rate of progress, the farther away it gets not only from the hub but also from the other groups. Eventually this unequal development disturbs the general balance, develops unsupportable stresses and may well wreck the vehicle of our progress.

More and more then we must tie together for their mutual support and for unified progress the various sectors of our ever expanding field of knowledge. More and more we are reminded that wisdom does not consist in the sum of what we know nor yet in our capacity for abstract reasoning. Rather is the essence of wisdom a highly developed critical faculty, a delicate sense of proportion that enables us to see men, events and ideas in their true relation to all others; to evaluate their relative importance and to ascribe to each the weight that belongs to it, no more, no less, in the general scheme. And more and more experience shrieks at us that our supreme need is neither more knowledge nor more intellect but more of the wisdom by which we can apply our knowledge and our intellect for our salvation rather than for our destruction.

SOME believe that we cannot do this short of state regimentation of the social and economic functions. Only "national planning," they tell us, can achieve the requisite balance in the allocation of human effort, and that planning can be managed only through the state. Obviously the acceptance of such a conclusion implies the surrender of many social ideals and human rights that hitherto we have taken for granted in our system. However reluctantly we might consider such a change, we should be realists enough to face its possibility and explore its limitations.

But in approaching the subject we should be realists enough also to confess that as yet we have done little to train a generation of men competent to tie the complicated web of our knowledge into a coherent whole under any system. Before we accept "economic planning" as inevitably a state function, we might try some of it under our system of private enterprise. But to do this we need some qualified planners; and where shall we seek them?

(To be concluded in an early issue)

Willard Chevalier

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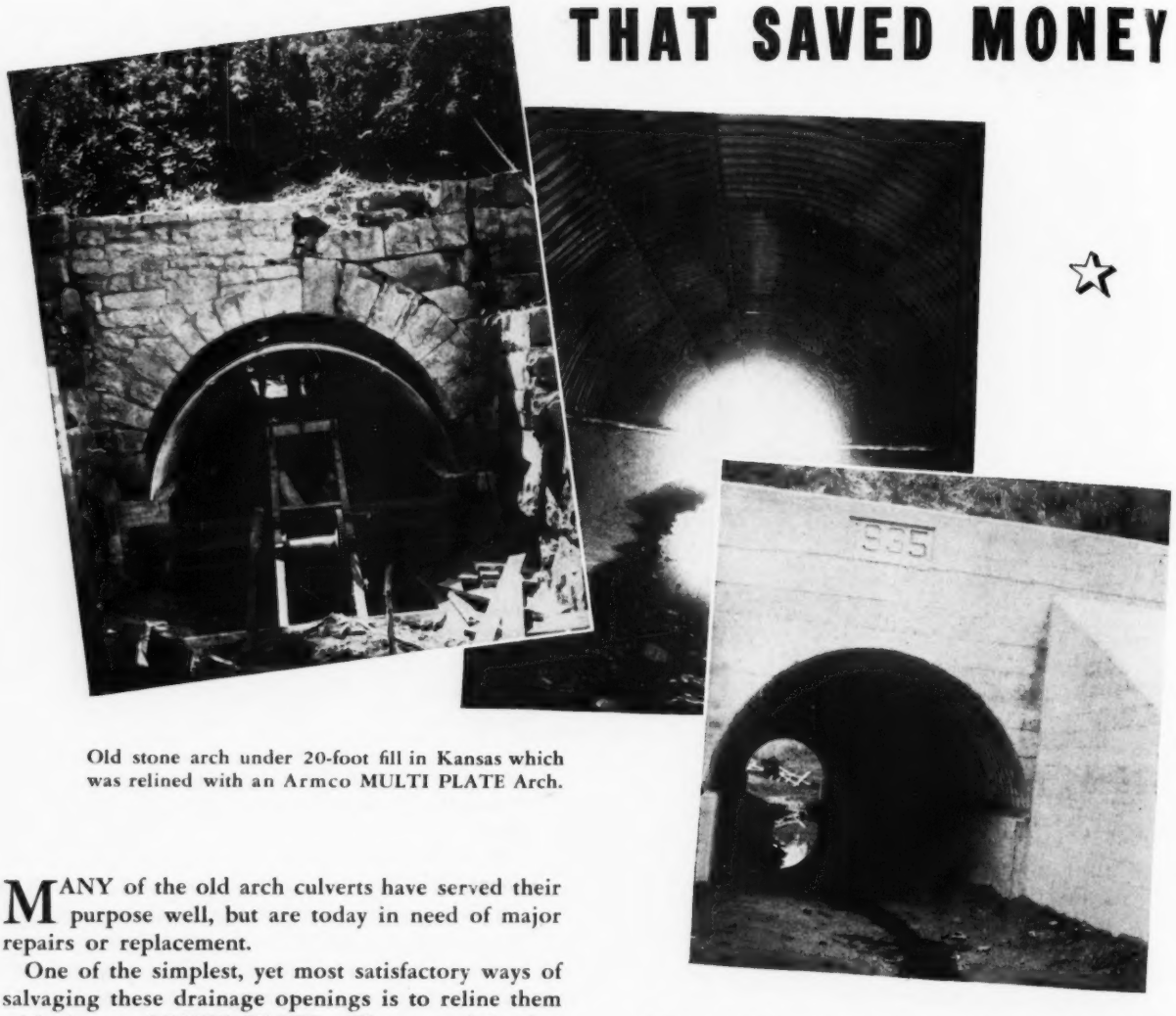

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A Wealth of Experience Back of
INTERNATIONAL HARVESTER POWER

An International Harvester T-40 TracTracTor pulling an 8-ton concrete roller on top of the East Barre rolled-earth dam near Waterbury, Vt. This is one of the new flood-control dams being built across the Winooski river. Four TracTracTors were used on this dam.

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In The News:

FEDERAL AID will be requested for the construction of a subway transit system in San Francisco estimated to cost $50,000,000. Robert Ridgeway, J. B. Snow and Alfred Brahdy, New York City subway designers, have been consulted in connection with the development of the plan.

THE FIRST TALL APARTMENT HOUSES to be built in New York City since 1930 are under way. Rising fifteen and nineteen stories respectively, they are eliciting considerable comment. Last year some twenty apartment buildings were built in Manhattan, but none was over six stories.

A 15,000-TON FLOATING DRYDOCK, to be launched next week at Seattle, is provided with curve-bottomed pontoons instead of the flat-bottomed type generally employed. This innovation in construction will increase stability and permit complete drainage of water from the dock interior as a precaution against marine wood borers.

A FEDERAL SUBSIDY for low-cost slum-clearance housing was urged by the National Public Housing Conference in a three-day meeting in Washington. Endorsement of the proposed Wagner Bill, which would furnish this subsidy to municipal housing authorities, was also recorded by the meeting.

ANOTHER EVENTFUL STEP in the completion of Boulder Dam was reached late this month when the last pipe section to form the penstock system was lowered into place via the 150-ton cableway over Black Canyon.

OPENING OF A glass-block building in Toledo last week, to house the packaging research work of Owens-Illinois Glass Co., is an occasion of note. It marks the entrance of glass block into construction service as distinct from the architectural service in which it has heretofore found application.

In This Issue:

THE NEW BUZZARDS BAY LIFT BRIDGE over the Cap Cod Canal has considerable claim to be included near the top of any list of notable bridges built in 1935. Its span of 544 ft. is the longest in existance. It is the first lift bridge to make use of anti-friction bearings. Its operating equipment is of the synchronous-motor type. Its tower outline and incidental decoration were developed by architects. And its erection was carried out under difficult tidal conditions. These notable facts are elaborated in the lead article of this issue.

REQUIRING THREE YEARS for construction, the 70-m.g.d. extension to Milwaukee's sewage-treatment facilities was placed in operation last month to increase the plant capacity to 155 m.g.d. How the experience of the past ten years' operation guided the design of new features is described by Darwin W. Townsend, consulting engineer of the Milwaukee Sewerage Commission.

IN APPLYING the Proctor method of soil control for the compaction of embankments forming the Sutherland Reservoir in Nebraska, certain changes in procedure were made which speeded the work without loss of efficiency. Details of the improved technique are described by Frank B. Campbell, now with the Soil Conservation Service at Statesville, N. C.

THAT EFFICIENT PRODUCTION on a relief works can be attained is exemplified by results obtained at the Brooklyn Navy Yard, where 2,300 workers are engaged on ten projects costing $3,000,000. Sound organization and careful management, with emphasis on *works* rather than *relief*, are credited for the success of this program, the operation of which is outlined in a staff article.

ANNUAL REVIEW ISSUE

Progress and accomplishment in civil engineering during the past year will keynote the Feb. 7 issue. Selected authorities in their respective fields have joined with the editorial staff to compile a comprehensive appraisal that includes:

An Editorial Review.
Chronology of Engineering Events.
Status of Major Projects.
Business and Construction.
Engineering Science and Practice.
Influence of Technological Changes.

Roadbuilders News

1. Convention report summarizing the technical sessions of the American Road Builders Association meeting at Cleveland.

2. An official appraisal of the five-year highway construction program carried on with emergency funds—by Thomas H. MacDonald, chief, Bureau of Public Roads.

3. New equipment and materials—a special eight-page supplement in which the exhibits at the 1936 Road Show are described.

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January 30, 1936

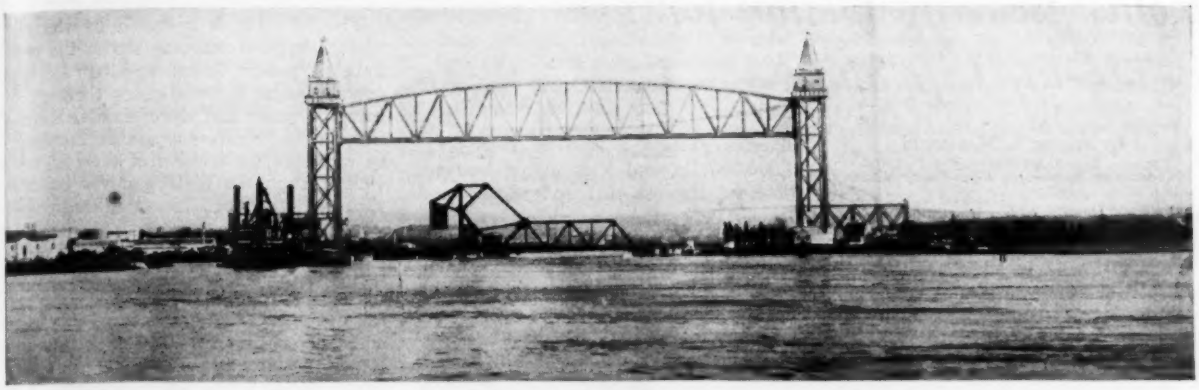


FIG. 1—MARINER'S VIEW of the new Buzzards Bay lift bridge, whose 544-ft. opening frames the present 160-ft. bascule and in comparison gives visual evidence of how much the Cape Cod Canal is to be widened.

Lift Span Over Cape Cod Canal Sets New Precedents

Railway structure at Buzzards Bay, Mass., is longest vertical-lift span in the world, first to use roller bearings, one of highest lifts on record, one of first to utilize architect's services and pioneer in adoption of photo-electric cell control of lights

AMONG the extensive improvements being made to modernize the Cape Cod Canal in Massachusetts for coastwise shipping, the new lift bridge built by the federal government to carry the New York, New Haven & Hartford Railroad is most notable. The two high-level highway bridges of arch continuous-truss type at Bourne and Sagamore *(ENR,* Jan. 25, 1934, p. 107) have their counterparts in at least two previous structures. Dredging the canal to greater width and depth as provided for under the present plan involves a large but otherwise routine operation. The single-track railway lift bridge at Buzzards Bay, however, sets new precedents both in span and design, and its erection was characterized by an interesting procedure planned to meet high tidal currents and the needs of shipping. In a previous article *(ENR,* Jan. 3, 1935, p. 1) the difficult foundation construction on this bridge as well as on the highway bridges was outlined, so that this article completes the chronicle of a notable undertaking.

The Cape Cod Canal lift span measures 544 ft. c. to c. of end bearings and is thus the longest vertical lift in the world, exceeding by 10 ft. the span of the highway bridge over the Delaware River between Burlington, N. J., and Bristol, Pa. It has a width of 27 ft. c. to c. of trusses and is 69 ft. deep at the center. In the open position it provides a clearance of 139 ft. above mean sea level and a clear canal width of 500 ft. between fenders. It is planned to maintain the bridge in an open position most of the time, since there are only a few train movements across the canal daily. Noteworthy features of the lift span are the synchronous hook-up of the operating motors that are located at the tops of the towers and the use of roller bearings for the main counterweight sheaves. Both of these features tend to reduce both the first cost and the maintenance and operating costs of the bridge, while the elimination of operating machinery from the span itself aids in improved appearance, which was one of the prime considerations throughout the entire design.

The lift span is flanked by two tower spans similar in design, except that the north tower span supports an operator's house. These spans are 128 ft. long and 33 ft. wide c. to c. of trusses. The towers are 260 ft. high from pier level to the stainless-steel ball that is used for a finial.

A total of 5,037 tons of steel and machinery is used in the superstructure. Of this, 2,620 tons are in the tower spans and 1,870 tons are in the lift span, which is of silicon steel except for the chards in the end panels. There are 547 tons of machinery and wire rope. As between carbon and silicon steels, the respective tonnages are 2,144 and 2,248. The total moving load, exclusive of machinery, is 4,450 tons.

The bridge was designed and its construction supervised by Parsons, Klapp, Brinckerhoff & Douglas (with whom J. A. L. Waddell and Shortridge Hardesty are associated) who acted as consulting engineers to the Corps of Engineers of the U. S. Army. Col. John J. Kingman, Boston district engineer, is in charge of all of the Cape Code Canal

work. McKim, Mead & White were the architects. The Phoenix Bridge Co. fabricated and erected the bridge. P. H. Zipp was the subcontractor on the electrical work. The following two articles by members of the staff of the consulting engineers and of the contractor describe the work in detail.

Roller Bearing Design for a 544-Ft. Lift Span

By Eugene L. Macdonald
Parsons, Klapp, Brinckerhoff & Douglas, Consulting Engineers, New York, N. Y.

THE features that distinguish the vertical lift span over the Cape Cod Canal, in addition to its record span of 544 ft., are the use of roller bearings on the counterweight sheaves, the high development of the synchro-tie method of driving and the retaining of architectural services in an attempt to beautify this usually homely type of structure. The bridge constitutes the western gateway to the canal, and the towers were treated as shafts marking the canal entrance. As the mariner moves up Buzzards Bay the aerial beacons at the tops of the towers and the arched top chord of the span itself give him the first intimation that he is approaching the canal, since its entrance is hidden by a point of land. One of the distinguishing characteristics of the bridge and one which contributes to its pleasing appearance, is the use of the "tower drive," which permitted the placing of the operating mechanism within closed houses at the tops of the towers, keeping the structure entirely free of machinery and appurtenances. The outline of the towers, the proportioning of the primary elements and the ornamentation were the work of the architects.

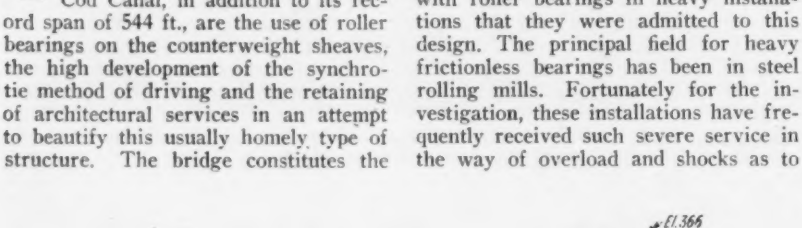


FIG. 2—A NEW RECORD SPAN for vertical lifts is set by the Buzzards Bay lift bridge over the Cape Cod Canal.

Adoption of roller bearings

The lift span is suspended by 80 2¼-in. diameter wire ropes, which pass over four 15-ft.-diameter sheaves located on each tower. Each of these 10-rope sheaves carries a load of more than 1,000,000 lb., and it is in the bearings of these sheaves that rollers are used. It was only after an exhaustive investigation of the use and results obtained with roller bearings in heavy installations that they were admitted to this design. The principal field for heavy frictionless bearings has been in steel rolling mills. Fortunately for the investigation, these installations have frequently received such severe service in the way of overload and shocks as to have broken down completely, thus establishing the ultimate strength to be expected. The research indicated that the roller-bearing manufacturer who claimed that the bearing which he recommended for this bridge would be good for 100,000,000 revolutions might be right. Since this number of revolutions represents about a thousand years of life of the bridge, the designers felt safe in utilizing roller bearings.

The excess of cost of roller bearings over the usual bronze bearings was about $35,000, which is more than offset by the capitalized cost of the annual saving in power. This type of bearing permitted the reduction in the total horsepower of the driving motors from 600 for bronze bearings to 300. The saving in power cost was also magnified by the method of computing the bill, which takes into account a stand-by cost for connected horsepower.

The bearing on each end of each counterweight sheave shaft has an outside diameter of 45 in., the diameter of the shaft is 22 in., and the bearing contains 32 2½ in.-diameter rollers 14¼ in. long. These rollers are, however, cut into two lengths—8 and 6¼ in.—so placed in the bearing that the joints are staggered. Each one of these bearings complete weighs a little more than 9,000 lb.

Synchro-tie operation

The lift span is operated by electric motors, located near the top of the two towers, power being applied to the counterweight rope sheaves through a train of gears and differentials. Rotating the big sheaves operates the span by virtue of the friction of the counterweight ropes in their grooves on the sheaves. It is not anticipated that there will be any slippage of the ropes on the individual sheaves, but differentials were installed as a precaution. The large differential on the shaft that connects the two corners on each end of the span could not be left freely moving because it might encourage unleveling the span transversely. For this reason this differential on each tower is so arranged that it can be brought into play only at the will of the operator, to correct any out-of-level condition, and is so interlocked that it can be used only when the span is within 6 in. of being seated on the piers.

The two ends of the span are kept in step while in motion by means of a 150-hp. synchro-tie motor installed on the same shaft with each of the 150-hp. driving motors. Referring to Fig. 4, motors A and D (on opposite towers) may be used as power motors and B and C as synchronous tie-in motors; also B and C may be used as power motors and A and D as tie-ins. If any one of the four motors is cut out, its mate on the opposite tower can drive the span, and the remaining two motors will act as tie-in motors; also with one motor out of service on each of both towers the remaining two motors can operate the span. If the normal power source is cut off, the span may be operated by auxiliary motors E and F on each tower, supplied with power by a gas-engine generator set.

Besides the synchro-tie for keeping the span level, there have been provided two skew indicators equipped with rheostatic leveling, one to operate in connection with the main power control and one with the emergency power. In conjunction with these automatic leveling devices, there has been installed a hand controller by which the operator can govern the leveling manually. If the operator, in using this hand control, releases the control handle before the automatic system has caught up, the handle will be returned to the automatic point through the action of a spring which is part of the controller operating head.

Each of the six motors is equipped with a thrustor-operated brake designated by the same letters as the motors. In addition to the six motor brakes, there are four drag brakes, G, H, J

and K, on the shafts turned by the motor pinions which are operated by springs and held off by thrustors. Their inclusion in the design resulted directly from the use of roller bearings, which have a friction coefficient of only ½ per cent as compared with the 4 to 12 per cent of a bronze bearing. The drag brakes have a capacity a little greater than the difference in friction between roller bearings and bronze bearings, so that, when applied, they will not ordinarily stop the span but merely make its movement as sluggish as if bronze bearings had been used. In normal operation the first point on the controller releases brakes B and C, the second releases brakes A and D, and this point also applies power to the synchronous-tie motors in proper sequence to insure locking the two ends of the span together. This is accomplished by first applying single-phase power to the primary of the synchronous-tie motors in two steps, followed by 3-phase power, all on the one controller point. When the 3-phase power is applied, it is in the proper phase rotation relative to the main driving motors, to insure the torque characteristics that give stable operation over the speed range.

Moving the master controller to the third, or drift point, releases the rest of the brakes, G, H, J and K, and on the next position of the controller power is applied to the main driving motors and the span is operated in the normal manner.

Once the span is under way, the synchro-tie is maintained in operation continuously except that in the down direction the power supply to the synchro-tie motors is cut off when the span is about 2 ft. from the piers. This permits the sure seating of the two ends of the span independently of each other.

When operating without the synchronous-tie motors connected as such, the master controller is used to operate the span, with a leveling controller to maintain the span in its proper position. The hand-operated leveling controller and the skew indicator provide five points of automatic leveling in each direction, the last point cutting off all power and applying the brakes if the span becomes out of level as much as 2 ft.

The brake circuits are equipped with time relays, so that it is never possible for all brakes to go on at once. The drag brakes, G, H, J and K, always go on first whether power is cut off by the controller, the limit switches or through failure of supply. A and D go on next, followed by B and C. A and B, and C and D are interchangeable, however, with their respective time relays. Only one of each of these pairs is required in operating with emergency power.

Near either end of the span's travel the current is cut off and all brakes set, in sequence, by limit switches, and the span is arrested, after which the return of the master controller to the off position and then to points one, two, three, etc., releases brakes A, B, C and D; or, with emergency power, it releases brakes A, D, E and F and starts the motors again. Going down, when the span has been seated at all four corners, as shown by indicator lights, these brakes can be set by a single manually operated switch while power is still on the motors. Going up, the power is cut off first at a point 3 ft. from the top. The operator then starts the span going up again, and this time each end of the span is stopped independently when it reaches its fully open position and the upper-span locks fall into place.

The power for emergency operation is derived from an alternating-current generator driven by a gasoline engine. The emergency system duplicates in arrangement the control for normal operation except for the synchro-tie feature.

The need for the drag brakes was particularly brought out in the study of the method of keeping the span level when operating with emergency power. For this condition of operating, the leveling is taken care of by the automatic rheostatic leveling. This system is completely satisfactory when the motors driving the span are operating under power. Should, however, the span start coasting with sufficient momentum to overhaul the machinery and the motors, the rheostatic device would operate in the wrong direction—that is, it would allow the leading motor to continue to accelerate. To overcome this, the drag brakes are connected electrically to the leveling device so that when this device is called into play and moves to its first point of correcting the level it also ap-

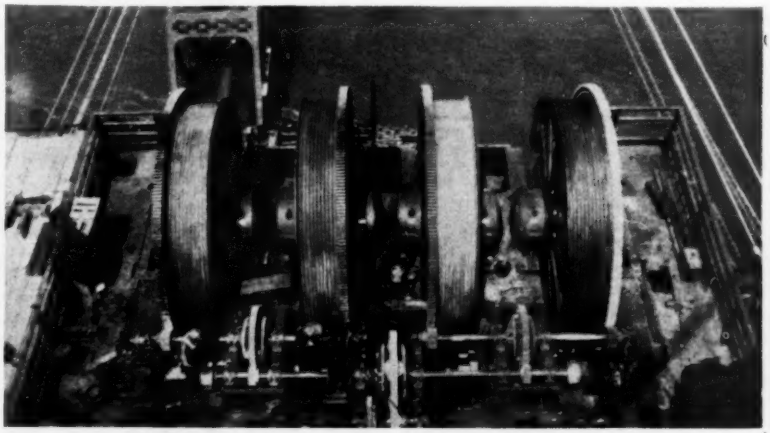


FIG. 3—ROLLER BEARINGS for the main counterweight sheaves (in the boxes on the hubs) provide a design element new to lift-bridge practice.

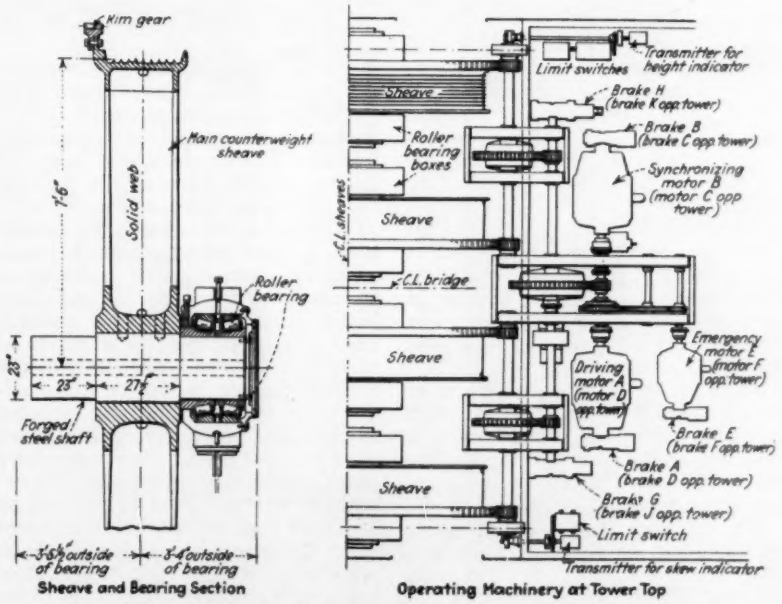


FIG. 4—DRIVING MACHINERY on the tops of the two towers is tied together electrically by synchronous motors that maintain the span exactly level. The extensive braking system shown is partly a result of the use of roller bearings and their low friction characteristics.

plies the drag brakes. This will slow up the span and machinery sufficienty so that power will be required to drive the motors forward, and the leveling device will take effect in the right direction.

As an additional safeguard in connection with the leveling, a mechanical limit switch is geared to the machinery, which will cut off all power from the motors and apply the brakes should the span in any emergency get out of level by as much as 3 ft. in its length. This gives a 1-ft. margin over the range within which the electrical safeguards to leveling are supposed to work.

Structural considerations

The problems encountered in the designing and detailing of the structural steel differed from smaller structures only in the size of members and stresses to be accommodated. The introduction of double intersection bracing in the tower spans (for architectural reasons) provided a minor problem, however, in one panel—the one containing diagonals U_6L_4 and U_4L_6. Here the fact that the main tower column with a section of 371 sq.in. forms one side of the panel prevented equal distribution to the two diagonals. This was overcome by leaving the upper end of U_4L_6 unconnected until two panels of the tower had been erected. This applied sufficient dead load in diagonal U_6L_4, so that in sharing the balance of the shear in this panel with U_4L_6 equal distribution was attained.

The usual specification for wind load —15 lb. per sq.ft. for the open position —was increased to 30 lb. for this bridge because it is anticipated that normally the lift span will be in its raised position, since more ships than trains have to be accommodated. With the span raised and a quartering wind of 120 miles per hour blowing, the tower to which the span is tied longitudinally will deflect a calculated amount of 2 inches. The towers are also deflected toward each other at each raising of the span due to the action of the auxiliary counterweight ropes, which are attached at panel point U_4 at each end of the lift span. This auxiliary counterweight is a patented device for overcoming the unbalancing effect of the shifting of the weight of the counterweight ropes from the span side to the counterweight side of the sheaves.

Since the operating machinery is on the tops of the towers at an elevation of 180 ft. above the railroad track, a one-man elevator has been installed in each tower for convenience in maintaining the operating equipment.

The lift span is held to its course while moving by guide rollers, which come in contact with the main tower columns. This is the usual practice but, in this case, with the combination of the extreme length of the span and of the doubled specification for wind, the rollers are greater in size and in number than on past structures. At the south tower there are six rollers provided at the elevation of the bottom chord of the lift span, to resist longitudinal motion and four rollers to guide the span transversely. At the north tower there are only four rollers to take transverse load—one at each of the top and bottom chords. All of these rollers are equipped with self-lubricating bronze bushings.

Air buffers are provided at each of the four corners of the span, to facilitate its being seated gently on the piers. Buffers are also provided to ease the span into the open position, at which point it comes against structural-steel stops. This definite limit of opening was used to facilitate the locking of the span in the open position, as it was thought best to add to the reliability of the brakes the positive safeguard of a lock, so that vibration could not by any chance start the span on its downward travel.

The rail locks used on the Cape Cod span embody the principles used in previous designs but include radically different details due chiefly to the length of the span and the resulting amount of expansion that has to be taken care of. In brief, the alignment of the rails is secured by a wedge-shaped adapter on the lift-span rails that engages a slot in the enlarged base of the first lengths of rails on the tower span which are left floating. The shifting of these floating rails is permitted by providing long tapered expansion joints at their far ends.

The counterweight ropes, as usual in recent installations, were not provided with any equalizing device other than the threaded eyebolts by which they are attached to the lifting girder of the lift span. The equal distribution of stress in the 40 ropes at each end was achieved by plucking them at a point part way up the tower and timing their oscillations.

Photo-electric control of lights

The span is equipped with all the lights and signals required for shipping and air traffic. These include lights on the stainless steel pinnacles of each of the towers and on the highest point in the center of the lift span. All of these lights are operated by a photo-electric cell, which is supposed to recognize darkness as it advances in the evening and disappears in the morning. Power for the lights on the span comes through a loop of cable swung from the aerial cables that cross the canal on each side of the lift span. To avoid the necessity of running the large generator set at times when the principal source of power has failed and when it is not desired to operate the lift span, a smaller set has been provided to furnish sufficient power for the lights, the elevator motors, the oil-burning furnace in the operator's house, and the various pumps and warning signals. This set starts automatically when the normal power fails.

Erecting a 544-Ft. Lift Bridge

By William A. Ellis
Assistant Engineer of Erection, Phoenix Bridge Co., Phoenixville, Pa.

ERECTION of the superstructure of the 544-ft. span Buzzards Bay lift bridge required a study of four distinct erection problems concerned, respectively, with the tower spans, the towers, the end thirds of the lift span and the central third of the lift span. The principal difficulties were encountered in the erection of the lift span, which was carried out by cantilevering procedure aided by a derrick boat in effecting closure across the channel, which was permitted to be closed to navigation for only 120 hours. The original plan was to float the center section of the span into place, but dredging of the canal prism during the period when the towers and tower spans were under construction caused the tidal velocity to increase nearly 50 per cent, so that such a procedure was not deemed safe. Tidal velocities as high as 10 ft. per second lasting for two or three hours were recorded as compared to the 7-ft. velocity previously considered to be the maximum. Even with the erection method used, work was made more difficult by this high-velocity current caused by a difference of three hours in the tides at the opposite ends of the 8-mile canal and by the difference in tide range, which is 4½ ft. in Buzzards Bay at the west end and 11 ft. in Cape Cod Bay at the east end of the canal.

Tower spans and towers

Erection work began with the tower spans, the equipment consisting of two locomotive cranes of 60 and 75 tons capacity, which on the first pass set the floor system on sand jacks supported on cribbing. They also erected one panel of the lift-span floor on falsework, to provide more room for crane operation. This was followed by the erection of the lower sections of the main tower columns weighing 57 tons each, and then on the return pass by the erection of the tower span trusses and bracing, part of the permanent tower, and part of the temporary erection towers.

These temporary erection towers were supported on the tower spans extending upward 144 ft. above the top chord to a platform carrying a 40-ton steel stiff-leg derrick with a 75-ft. boom, which

FIG. 5—ERECTION of the Buzzards Bay lift span was accomplished by tower derricks and locomotive cranes, the latter erecting the end thirds of the span on falsework.

was used to erect the permanent tower. The derrick mast was located 12 ft. behind the permanent tower. Each erection tower and derrick weighed 137 tons, and bending in the top chord of the tower span was eliminated by supporting the erection towers on heavy I-beams clamped to the top chord at the panel points.

The derricks on these erection towers set the permanent towers, the sheave girders and the auxiliary counterweight boxes. While this was being done the locomotive cranes assembled the three counterweight girders into one cross-shaped unit, and all material making ends or sides of the counterweight boxes was assembled into large units and riveted as far as possible. The stiff-leg derrick then erected the counterweight girders, supporting them on links provided at the top of the towers for the emergency support of the completed counterweights. Each side and end of the counterweight boxes was then erected as a unit, and the bottom was erected last. This method eliminated much of the expense of erecting, fitting up and riveting in the air, much of the danger to men working below and in general expedited the work. After the main and auxiliary counterweight boxes were filled with concrete, the counterweight ropes, machinery at the tower tops, machinery houses and spires were erected.

Lift-span procedure

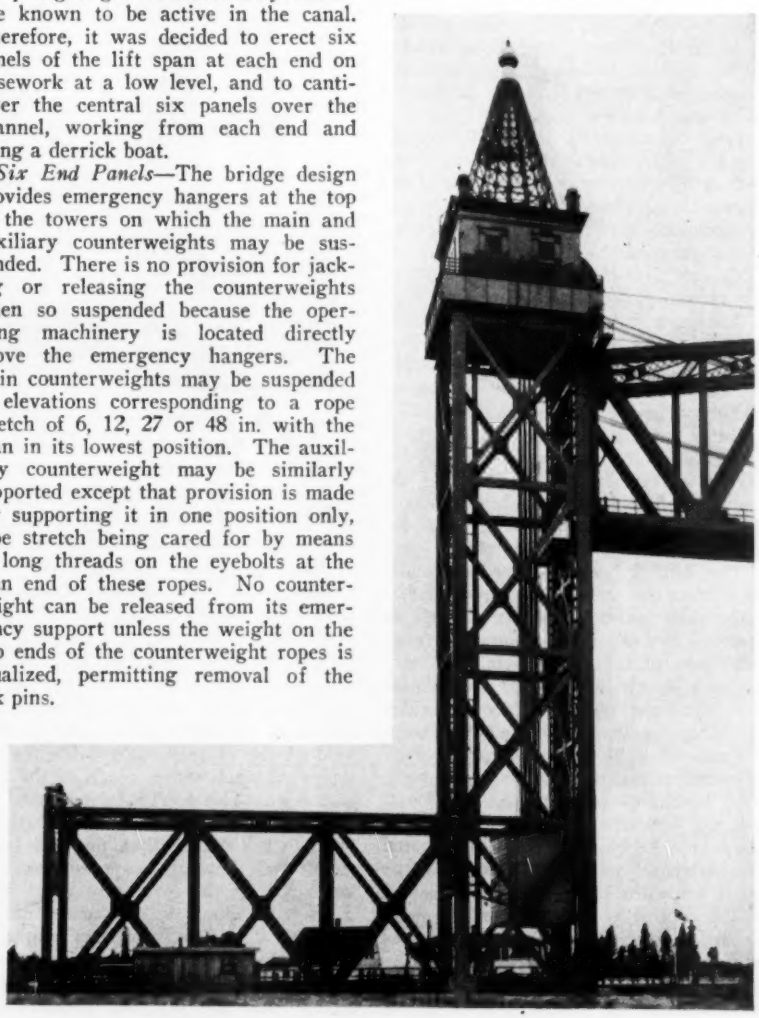
Erection of the lift span was influenced by local conditions and by the design. Specifications provided that "during erection the contractor will be required to maintain a navigation channel 160 ft. wide, in line with the channel through the existing bridge, with a vertical clearance of 134 ft. above mean sea level." The existing channel is at the center of the new span. The lift span could not be erected at a low level and floated in as a unit because the ends of the lift span dovetail between the main columns of the tower spans. Erection at a high level on falsework, with cantilever erection over the channel, was considered expensive and dangerous because of the difficulty in protecting the falsework from the impact of large boats operating in the swift current in the canal. Erection at a low level would decrease the time during which the span might be damaged by navigation and during which the timber piling might be attacked by marine life known to be active in the canal. Therefore, it was decided to erect six panels of the lift span at each end on falsework at a low level, and to cantilever the central six panels over the channel, working from each end and using a derrick boat.

Six End Panels—The bridge design provides emergency hangers at the top of the towers on which the main and auxiliary counterweights may be suspended. There is no provision for jacking or releasing the counterweights when so suspended because the operating machinery is located directly above the emergency hangers. The main counterweights may be suspended at elevations corresponding to a rope stretch of 6, 12, 27 or 48 in. with the span in its lowest position. The auxiliary counterweight may be similarly supported except that provision is made for supporting it in one position only, rope stretch being cared for by means of long threads on the eyebolts at the span end of these ropes. No counterweight can be released from its emergency support unless the weight on the two ends of the counterweight ropes is equalized, permitting removal of the link pins.

Because of the unknown stretch in the ropes, it was decided to erect the span 24 in. above its lowest position, assuming a 3-in. stretch in the ropes and allowing for a maximum stretch of 27 in. In deference to the possible rope stretch, the caps of all falsework bents were kept below the underclearance of the lift span when in its lowest position. The bents under panel paints 1 and 3 contained sixteen piles each, while those under panel points 2, 4 and 6 contained eight piles each. At panel point 5 a 73-pile bent was driven, to take care of jacking loads.

On this falsework the permanent floor, trusses and bracing of the lift-span ends were erected out to the canal channel on both ends of the span and swung free of all supports except the main piers and the heavy bents at panel point 5. The span ends were jacked up and the counterweight ropes connected to the lifting girders. After the ropes had stretched, the end floor beams were blocked up on the piers to relieve

FIG. 6—TOWER OUTLINE reflects a lighthouse motif based on the landmark character of the bridge at the entrance to the Cape Cod Canal.



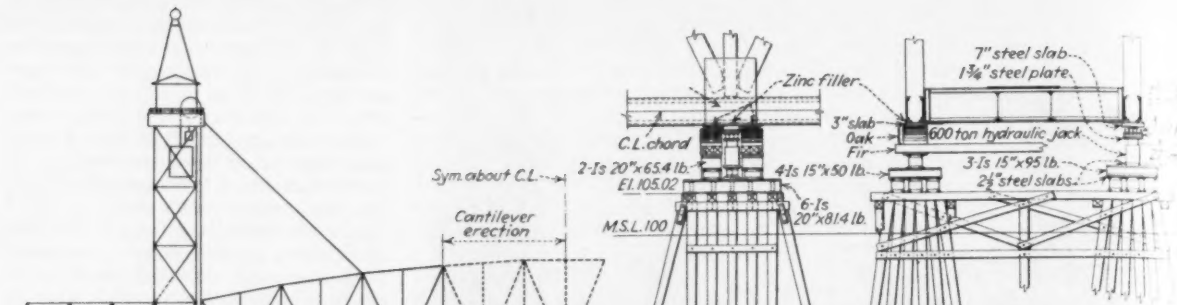


FIG. 7—SUPPORTS for cantilevering the center third of the span to closure were provided by 73-pile bents at panel point 5 at either side.

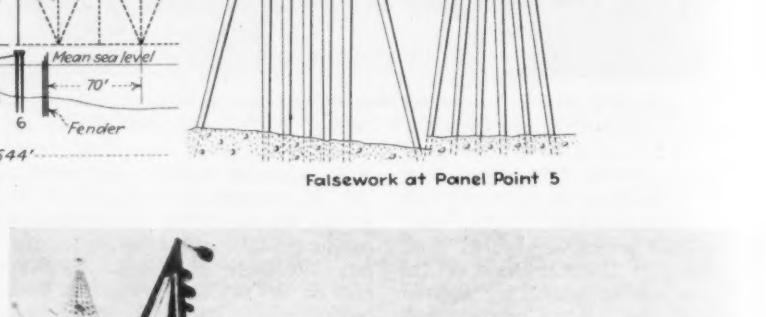


FIG. 8—DERRICK-BOAT ERECTION of the closing members of the span eliminated the need for falsework in the navigation channel.

strains on the machinery caused by the operation of locomotive cranes on the span. On the bent under panel point 5, heavy steel grillages, supporting 600-ton jacks and oak blocking, distributed the weight of the span into the falsework. By means of these jacks, the span was moved to accurate line and erection camber, after which the gap between the ends of the steel on opposite sides of the channel was checked for distance, and preparations were made to erect the central portion of the lift span.

Center Six Panels—Construction of the central portion of the lift span with a minimum interference to navigation was important. The contract provided for a period of 48 hours, during which the canal could be closed to navigation. However, because of the increased tidal velocity caused by dredging, this time was extended to 120 hours. During this period it was planned to complete the erection of the lift span by the cantilever method, using a derrick boat for members in the central part of the span.

The derrick boat, prepared especially to combat the strong tide, dropped two large ship anchors and ran a cable to each of the old bridge piers, to resist tidal flow to the east. Two large ship anchors, a smaller anchor and a line to a deadman on each shore provided anchorage against current running west.

Artificial light was provided in order to permit two eight-hour shifts to work. Ten floodlights of 750- and 1,000-watt capacity supported high on the towers were arranged so that two illuminated the material yard on each side of the canal while the other six were directed at the central portion of the lift span. In addition, eight reflectors were distributed throughout the length of the span, to light the walks; one was suspended above the central portion of the span, and two were arranged to light the outside of the west truss. Extension cords lighted points where the general illumination was not sufficient.

Navigation was officially stopped at 4:25 a.m., Monday, Sept. 16. The derrick boat maneuvered to a position east of the lift span, ran out anchors and was ready for work at 9:30. During this time, locomotive cranes erected one panel of stringers and track on each side of the channel, to provide for delivery of steel within reach of the derrick boat. The derrick boat erected the westerly truss of the south half of the span to the center, then the east truss, floor and bracing, cantilevering the south half of the span from panel point 5 to panel point 9, the center of the bridge. The boat was then moved to the north side of the channel, where it completed the erection of the west truss except that the top and bottom-chord splices at the center of the span were not connected. The closing bottom chord on the east truss was then erected, the north end of the span jacked 1 in. south, to close the bottom chords, and all remaining steel was erected. The last piece of steel was in place at 9:13 a.m. on Thursday, Sept. 19. Steel was then fitted up, temporary track and equipment were removed, and the span was balanced by the addition of portions of the permanent track.

At noon, men were sent to their stations, and the span was lowered by means of the two 600-ton hydraulic jacks under panel point 5 at the north end of the span, and four 300-ton jacks were similarly placed at the south end of the span until the full weight of the span was on the counterweight ropes. The pins were then removed from the main counterweight emergency links, permitting the span to be lowered so

that the auxiliary counterweights could be freed from their supports. The span was then raised about 15 ft., to permit erection of the four guide rollers at the top of the span which were inaccessible when the counterweights were up. As a final operation, the span was raised to its upper position and lashed at 7:10 p.m., Sept. 19. The total time navigation was stopped was 95 hours, 7 min., divided as follows: maneuvering the derrick boat, 13½ hr.; night shutdown, 24 hr.; steel erection, 47½ hr.; and balancing and raising the span, 10 hr.

During the time that the canal was closed to navigation, 280 pieces of steel weighing about 600 tons were erected.

The falsework bents under panel point 5 were the keys to successful cantilevering of the span. They were designed to carry a load of 900 tons per bent on 68 piles, and to resist horizontal forces due to tide, wind and rolling. The 68 piles were driven in five parallel rows, spaced 30 in. on centers. The piles were 55 ft. long, with 8-in.-diameter points, and were driven in 25 ft. of water to a penetration of 7 to 20 ft. in sand. Observations indicated a settlement of the top of the caps amounting to ¼ to ⅞ in. under full load.

The camber of the span over the jacking bent was determined after a careful consideration of the permanent camber of the span, its elastic deflection, an allowance for falsework settlement and erection camber, and an allowance for rope shortening due to reduction in load. The sum of these camber allowances was 17½ in.

The minimum vertical motion required of the jacks was estimated to be about 11 in., of which about 3½ in. was under full load and 7½ in. under a diminishing load. These estimates proved to be closely correct. In order to secure approximately equal loads on all jacks, they were operated simultaneously until a vertical movement of the span of about ½ in. was attained. Gage readings were then adjusted to close agreement by lowering the jacks carrying excessive loads. After this had been done, the operation was repeated until the pins connecting the main counterweights to the tower tops could be removed.

During this jacking the top of the hard-wood blocking between the grillages and the bottom chord was never allowed to be more than 1 in. below the steel. This blocking was so arranged that 1-in. layers of it could be removed at a time when the jacks were under their greatest strain. As the load on the jacks decreased, the blocking was increased in thickness, since the danger of jack failure was greatly reduced.

The work was fabricated and erected by The Phoenix Bridge Co.; John F. Kinter was general superintendent of erection, Harry A. Archinal field superintendent, and Frank W. Peirce resident engineer. The method and details of erection were designed by the writer.

Concrete Dam, Twice Raised, Shows Negligible Leakage

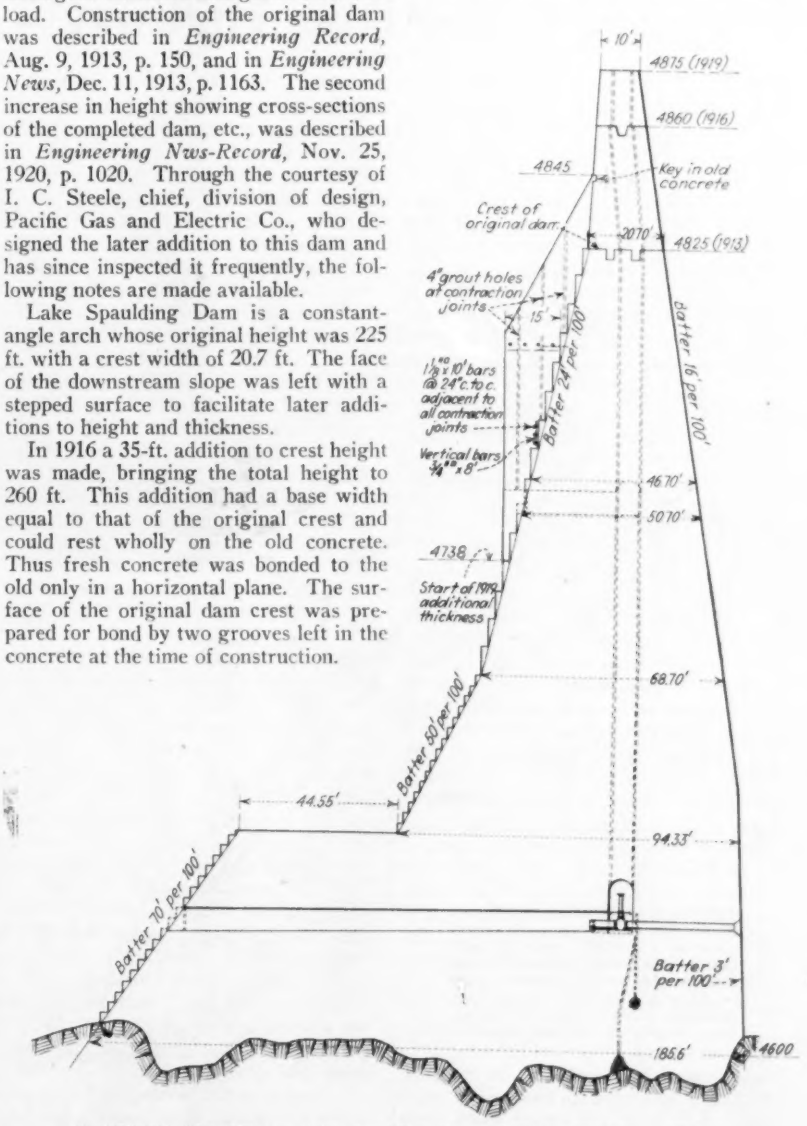
Lake Spaulding arch dam in California, built 225 ft. high in 1913, raised 35 ft. in 1916, 15 ft. more in 1919, shows only slight leakage along vertical and horizontal joints

QUESTION about the watertightness of bond between new and old concrete when additional thickness and height are added to a large dam has focused attention on dams to which such additions have been made. One of these which affords a particularly good example is the Lake Spaulding Dam on the south fork of the Yuba River in California. This structure has been raised twice, and in the sixteen years since additional thickness was added, frequently has undergone extensive changes in the water load. Construction of the original dam was described in *Engineering Record*, Aug. 9, 1913, p. 150, and in *Engineering News*, Dec. 11, 1913, p. 1163. The second increase in height showing cross-sections of the completed dam, etc., was described in *Engineering Nws-Record*, Nov. 25, 1920, p. 1020. Through the courtesy of I. C. Steele, chief, division of design, Pacific Gas and Electric Co., who designed the later addition to this dam and has since inspected it frequently, the following notes are made available.

Lake Spaulding Dam is a constant-angle arch whose original height was 225 ft. with a crest width of 20.7 ft. The face of the downstream slope was left with a stepped surface to facilitate later additions to height and thickness.

In 1916 a 35-ft. addition to crest height was made, bringing the total height to 260 ft. This addition had a base width equal to that of the original crest and could rest wholly on the old concrete. Thus fresh concrete was bonded to the old only in a horizontal plane. The surface of the original dam crest was prepared for bond by two grooves left in the concrete at the time of construction.

In 1919 the height again was increased, this time by a 15-ft. addition, bringing the total height to 275 ft. In this second addition it was necessary to increase the thickness of the arch ring. This was done over a total height of 107 ft. on the downstream face of the dam. This increase or addition to the arch had a maximum thickness of 15 ft. at a level 25 ft. below the original crest and was 3 ft. wide at the lower edge of the addition, 89 ft. below original crest level.



MAXIMUM SECTION of Lake Spaulding Dam, showing successive additions.

These relative thicknesses are shown in the accompanying illustration. Bonding to the downstream face of the original dam was facilitated by the use of steel rails left projecting horizontally from the old concrete for this purpose. Grout pipes were left in the new concrete and after the additional thickness had had time to set well, grout was forced into these pipes to fill any cracks that had developed as the result of shrinkage. At the same time shrinkage cracks in the original structure also were grouted.

Construction joints in the new concrete were put in opposite those in the original structure, thus continuing these joints through the thickened arch. Reinforcing bars were placed horizontally in the new concrete on either side of the new construction joints to prevent shear cracks in the new concrete near these joints. Finally the construction joints in the addition to the arch ring were closed by pressure grouting.

Since the completion of the final addition to the height in 1919, the reservoir has been filled every year except two (1924 and 1931). No evidence of leakage has appeared between the old and new concrete in the reinforcing ring except at two construction joints. Here the total seepage is estimated at 3 miner's inches (about 3/40 sec.-ft.). There is no leakage at the top or bottom of the reinforcing ring and none through the concrete between vertical construction joints, which are 80 ft. apart. The horizontal joint where the second addition was bonded to the first addition shows no leakage, though a few stains appear.

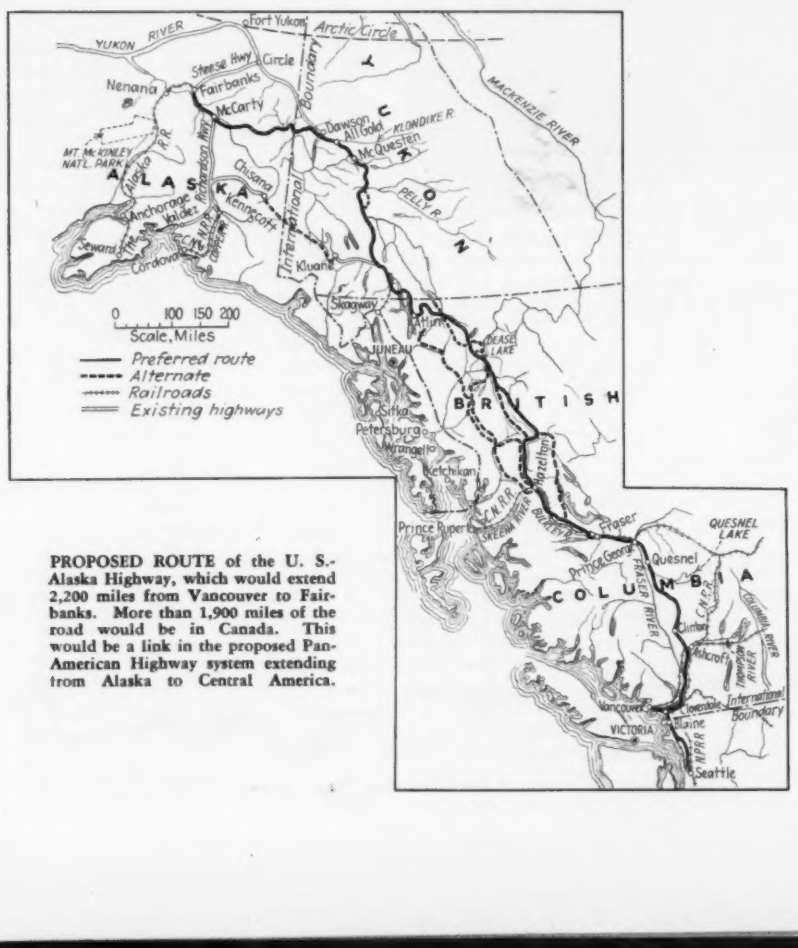
There has been no noticeable increase in leakage since the grouting of construction joints was completed. A total of perhaps 6 to 8 miner's inches of leakage comes through the various construction joints in different parts of the dam, and that emerging from the inspection tunnel is about 15 miner's inches, or ¾ sec.-ft.

No measurements have been taken to indicate how the additional heights of the dam react to the pressure load imposed by the increased reservoir level. However, the dam is performing its full function with entire satisfaction in every way.

Existing Roads To Be Used in Proposed U. S.-Alaska Highway

THE U. S.-Alaska highway, which has been proposed as the northern section of a Pan-American Highway, was carried one step farther when the last Congress passed an act authorizing the carrying out of negotiations with Canada. A sum of $100,000 was recently allocated with which to defray the costs of the negotiations.

As now contemplated, the road is to extend from Vancouver, B. C., through the Yukon Territory to Fairbanks, Alaska, a distance of about 2,200 miles. Of the proposed route, about 1,021 miles has already been constructed as part of local road systems. A road already connects Seattle, Wash., with Vancouver and through British Columbia to the Yukon Territory, where a total of 1,400 miles is needed. About 880 miles are now completed and can be utilized in the system. In the Yukon only about 50 miles of the necessary 530 is available. Alaska now has 91 miles of roads of the 274 miles necessary to complete the system.



PROPOSED ROUTE of the U. S.-Alaska Highway, which would extend 2,200 miles from Vancouver to Fairbanks. More than 1,900 miles of the road would be in Canada. This would be a link in the proposed Pan-American Highway system extending from Alaska to Central America.

From Vancouver the existing road follows up the Frazer River, over the Cariboo Plateau and then down the Bulkley River to the Skeena at Hazelton. From here the road goes through sparsely settled territory, and the favored route is up the Skeena River, across the headwaters of the Stikine to Dease Lake and then to Atlin, about 70 miles east of Skagway.

From Atlin to Whitehorse, in the Yukon Territory, the proposed road would follow an existing low-type road. From here it would follow the Yukon River north to Dawson. From Dawson the road would run almost due west to McCarty, where it would meet the existing Richardson Highway.

The topographic and climatic conditions are generally considered to be not much different from those in the northern part of the United States. The highest elevation over which the road will have to go is believed to be not more than 4,500 ft. above sea level. There is no abnormal rainfall during the summer, and although the winters are always extremely cold, travel is not generally blocked by deep snows except in passes, and either automobile or tractor traffic can be maintained throughout the year over most of the route.

It has been found throughout most of the territory over which the road will pass, especially in the Yukon Territory and Alaska, that the subsoil is permanently frozen, and only the surface thaws in summer. This gives rise to a number of drainage problems during the summer; on level ground, where drainage is difficult, corduroy roads would have to be utilized until adequate drainage could be provided.

Milwaukee Extends Facilities for Sewage Treatment

Present plant capacity of 85 m.g.d. increased to 155 m.g.d. by the addition of aeration units, sludge-settling tanks and appurtenant equipment costing $3,000,000—Experience of past ten years' operation guided design of new features

By Darwin W. Townsend
Consoer, Townsend & Quinlan, Consulting Engineers, Chicago, Ill.

AFTER three years of construction and an expenditure of almost $3,000,000, the extension to the Milwaukee sewage-treatment plant was completed and placed in operation early in December, to afford complete treatment for sewage flows up to the anticipated 1945 volume of 155 m.g.d. The capacity of the new part of the plant is 70 m.g.d., with the exception of main feed channels and return-sludge channels, which have been designed and constructed for an ultimate maximum of 300 m.g.d. Other parts of the plant besides tanks and channels which required expanding for the 155-m.g.d. rate were air blowers and piping, boilers, return-sludge pumps, waste-sludge pumps, rotary sludge dryers and the grit-and-screenings incinerator plant.

FIG. 1—LAND RECLAIMED from Lake Michigan enlarged the Jones Island site of Milwaukee's existing plant, to accommodate additional aeration and settling tanks.

Features in the extension include circulatory instead of the ridge-and-furrow method of aeration, twin sedimentation tanks without a dividing wall, vacuum type sludge-remover mechanisms, aerated channels with low-head differential-producing restrictions for volume measurements, insulated galleries, stainless clad steel plate, air pipes and cone valves to reduce friction, re-stokered boilers to increase boiler efficiencies, additional rotary sludge dryers and stack-gas deodorizing equipment.

The old part of the treatment plant, rated at 85 m.g.d., has treated sewage by the activated-sludge process since June, 1925, and since 1927 has been converting sewage sludge into a commercial fertilizer at the rate of 30,000 tons annually. During this ten-year period of operation the plant has at no time treated all of the sewage originating in the Milwaukee metropolitan drainage district, but only that portion for which the aeration and sedimentation tanks and appurtenances were designed—namely, 85 m.g.d.; approximately 25 m.g.d. has been bypassed untreated to the rivers and to Lake Michigan. Treatment devices preliminary to the aeration and sedimentation tanks are capable of treating sewage at an average rate of 200 m.g.d. and a maximum of 300 m.g.d., these facilities consisting of coarse bar screens, grit chambers and horizontal revolving-drum screens. This installed capacity is estimated to serve the metropolitan district until the year 1960, at which time the treatment-plant tract and the existing system of collecting sewers will have been utilized to their fullest extent.

In the new aeration tanks and channels the circulatory-flow method of aeration will be employed, in contrast to the system in the older and operating portion of the plant where aeration and agitation are secured by the so-called ridge and furrow method.

In each of the twelve circulatory-flow tanks there are four parallel longitudinal rows of diffuser plates, two rows being placed in each pass of a tank adjacent to and on opposite sides of a centrally and longitudinally located wall which divides the tank into two passes. Each tank is 370 ft. long and 21½ ft. wide, with a flow depth of about 15 ft. When operating, each two-pass tank provides a six-hour detention period for 5,750,000 gal. of sewage, with a return-sludge rate at 25 per cent of the sewage flow.

Each aeration unit is equipped with air and liquid meters of the venturi type, with arrangements for transferring the piezometer differentials to the mercury float chambers through the medium of low-pressure air (8½ to 9 lb. per sq.in.). This method of differential transfer possesses the advantage of eliminating float pipes and floats ordinarily used in venturi meter installations.

The four rows of diffuser plates will receive their air supply through branch pipes from a submerged pipe header extending throughout the length of the inlet pass of a tank. This header is located 11 ft. from the dividing wall and 5 ft. from the tank bottom, so as to minimize interference with the circulatory motion of liquid when the tank is in operation. The branch pipes for supplying air to the diffuser plates, located in an outlet of the tank, pass through circular openings in the concrete dividing wall.

In the purchase of air-diffuser plates with which to equip tanks and channels, proposals were received from three companies, and contracts for 13,500 plates each were awarded to the two bidders, who had previously satisfactorily manufactured and shipped plates within the range of 32 to 36 cu.ft. of free air per minute at a pressure corresponding to a 2-in. head of water.

In collaboration with the three manufacturers of diffuser plates and an independent testing laboratory, the engineers of the sewerage commission under the direction of the writer, some months prior to inviting proposals for this work, carried on research and tests to establish standardization in the matter of diffuser-plate permeability rating. This work involved studies relating to air humidity, air temperature and condensation of air vapors and the improvement of plate-testing equipment generally. As a result of these investigations, the following definition of plate-rating air conditions was written into the specifications under which all plates were tested for acceptance:

"Permeability is defined as that quantity of dry free air, in cu.ft. per min., which will pass through 1 sq.ft. of plate when tested dry at a 30-in. mercury absolute pressure and 70 deg. F.

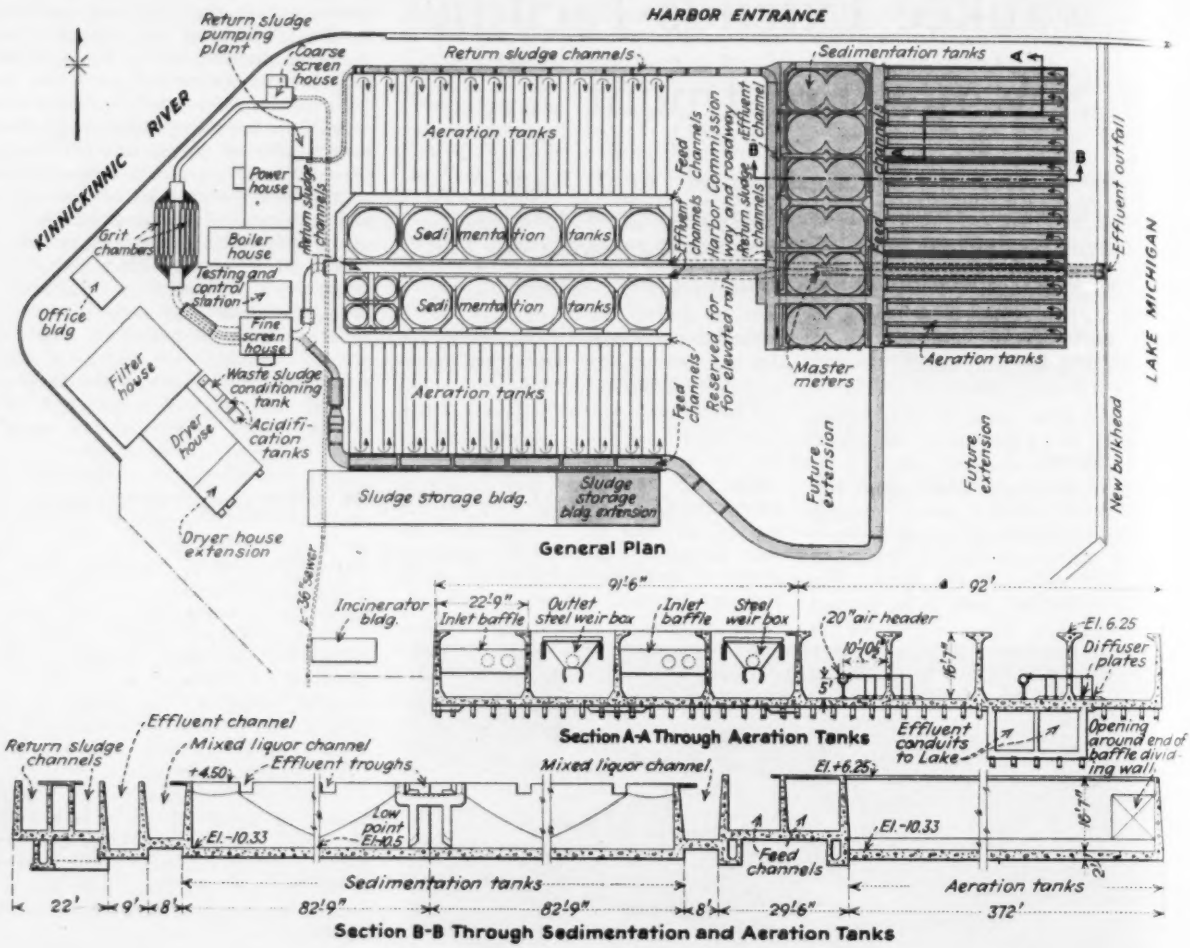


FIG. 2—GENERAL LAYOUT of the 155-m.g.d. Milwaukee activated-sludge plant, showing recent additions that have almost doubled the capacity of existing works.

under a pressure equivalent of 2 in. of water at underneath face of plate."

The diffuser plates are cemented into precast concrete containers, there being in the majority of instances nine plates per container. The containers are set upon a sand cushion ½ in. in depth, this cushion serving as the medium by which plate leveling is accomplished.

Sedimentation tanks

The sedimentation-tank design departs somewhat from the more or less conventional types ordinarily used in activated-sludge plants, the design adopted having been developed along lines of structural economy, efficiency of sludge settling and sludge removal, economic utilization of ground area and uniformity in the matter of flow velocity and distribution.

Each of the six sedimentation tanks is generally rectangular at the top, the length being 161½ ft., the width 84 ft. and the center liquid depth 14 ft. The bottom has a slope of 2 in. from the central points to the periphery of the revolving sludge-removal mechanisms, making the side liquid depth 13 ft. 10 in.

Sewage to be clarified will be admitted to the tank from the aerated feed channels through submerged gate-controlled openings in the two end walls. There are five of these openings in each wall; each opening is 9 ft. long, horizontally, and 9 in. wide. The openings are sloped downward through the walls at 45 deg. and are submerged 3 ft. below the liquid level inside the tank. Effluent will be removed by seven overflow weir troughs, the longitudinal axes of which are located at right angles to the direction of liquid flow in the tank. The open end of each effluent trough terminates in a collecting channel located between sedimentation tanks. These collecting channels join a main channel, which in turn will discharge its flow into two effluent conduits that pass underneath the aeration and sedimentation tanks and terminate below lake-water level at the outer face of the easterly plant dock wall.

Settled sludge will be collected and removed from the tank bottoms by means of revolving sludge removers of the suction type. Two of these mechanisms of the two-arm type with independent discharge lines are installed in each sedimentation tank; they are constructed of cast-aluminum pipe sections specially designed; the entire weight of the mechanisms, plus the weight of the vertical drive shafts, is supported by lignum vitæ bottom bearings. The bearings are permitted to rotate in cast-bronze seal rings set in concrete.

Owing to the fact that the sludge removers are supported by bottom bearings, a relatively light steel-truss overhead structure can be used. This structure is only sufficient in strength and rigidity to support the driving mechanisms, a small live load and its own weight.

Inasmuch as the sludge removers in each tank are driven from a centrally-located single motor and speed reducer set through two-way horizontal line shafting, only one main truss with trussed cantilevered side outriggers is used. This type of design with its shorter span possesses considerable economic advantage over a two-truss design and its necessary longer span. In the adopted design, economy in concrete-wall construction was obtained by

elimination of the additional wall or walls (depending upon adjacent channel arrangement) which would have been necessary had two separate tanks of equivalent capacity been provided.

In operation, this type of tank may receive its flow of aerated sewage through either or both sets of inlet gates located at the end walls, and the duplicate sludge-collecting and discharge facilities may be so regulated as to control advantageously the volume and density of sludge to be withdrawn.

The flow of sludge into and through the revolving sludge collectors and thence from the tank will be controlled at the will of the operator, through duplicate hand-controlled sludge-discharge mechanisms. These devices consist essentially of telescopic 20-in.-diameter vertical pipes that will discharge the sludge at any desired rate into an open sludge well immediately adjacent to the overflow pipes, thence through a horizontal 18-in. sludge meter of the venturi type. From the meter the sludge may go into either, or both, of the duplicate aerated return-sludge channels, which terminate at the return-sludge pumping plant located in the power house some 1,000 ft. distant.

Channels and operating galleries

Because of the limited hydraulic head available for the large sewage flow volume to be ultimately treated upon the present plant site, it was essential that liberally proportioned feed channels be provided. Throughout the entire length of these channels, which are in duplicate and are 12 ft. in width with an approximate 12-ft. flow depth, circulatory aeration will be used. This will serve to aerate the sewage, prevent deposition of solids while sewage is en route to the aeration tanks and minimize head losses that would occur if gravity flow alone were employed with the requisite higher velocities.

The feed channels, which are 2,200 ft. in length, measured from the point where return sludge will be introduced into the sewage to the most northerly aeration tank, connect with the existing tail-water channel just east of the present fine screening plant. This screening plant, as previously noted, has sufficient capacity for the ultimate 300-m.g.d. maximum flow rate.

Return-sludge conduits are also equipped with diffuser plates to prevent solids deposition. These duplicate channels, each 6 ft. wide with a 6-ft. flow depth, are covered with a flat concrete roof at grade level with openings at fixed intervals, so as to afford a substantial passageway along the northerly side of the plant.

The aerated liquor supply channels adjacent to the sedimentation tanks, equipped with diffuser plates, are 6 ft. in width and will have a flow depth of 11½ ft. These channels are provided with facilities for the installation of bulkheads which, when the occasion requires, will make it possible to isolate and dewater channel sections with the minimum of interference to the operation of the sedimentation tanks.

The duplicate main effluent conduits are each 10 by 10 ft. in cross-section and have a combined maximum capacity of 300 m.g.d.

An interesting and important feature incorporated into these conduits is that of duplicate hydraulic-head differential-producing restrictions designed to measure and record the total effluent volume discharged from the plant. The design of these restrictions embodies general venturi meter principles, using Pardoe curve upstream entrances, tapered side approaches to throat sections 10 ft. high and 2 ft. 5 in. wide, and long side-tapered downstream head-recovery sections. Inasmuch as little head was available for total flow measurement—not in excess of 0.25 ft.—extreme accuracy of both design and construction was essential, the design data for this work having been obtained from the operation of scale models.

windows being constructed of aluminum.

A connecting passage, similarly constructed, joins the new and old galleries, thus placing the operating facilities of the old and new tanks under one roof. This provision also afforded a housing for a new main air header extending from the power house to the new aeration-tank operating gallery.

Air piping and blowers

A new 60-in. air main, fabricated from stainless clad steel plate, cross-connects in the power house with four 30,000- and two 50,000-cu.ft. per min. steam turbine-driven rotary blowers, and extends, as previously mentioned, to the new aeration tanks. The total length of this main is approximately 1,550 ft.

The old portion of the plant is served by a 72-in.-diameter cast-iron main air header, which also is cross-connected to the blower units in the power house. This pipe has sufficient capacity, within reasonable head-loss limits, to supply air to treat 85 m.g.d. of sewage. The new and smaller main with its smooth, stainless-steel interior and lower friction coefficient will supply sufficient air for the treatment of 115 m.g.d. of sewage. The unit rate of air application is on the basis of 1½ cu.ft. of free air per gallon of sewage for aeration tanks and channels, with the pressure at the blowers ranging between 8½ and 9 lb. per sq.in.

The branch headers serving the aeration tanks are cast iron with bell-and-spigot joints, and the branch piping connecting the diffuser-plate containers to these headers is genuine wrought iron, galvanized. This latter type of pipe was also used for most of the air-supply lines in the various channels. The stainless clad steel pipe is of welded construction throughout, stainless welding rod having been used and the welds

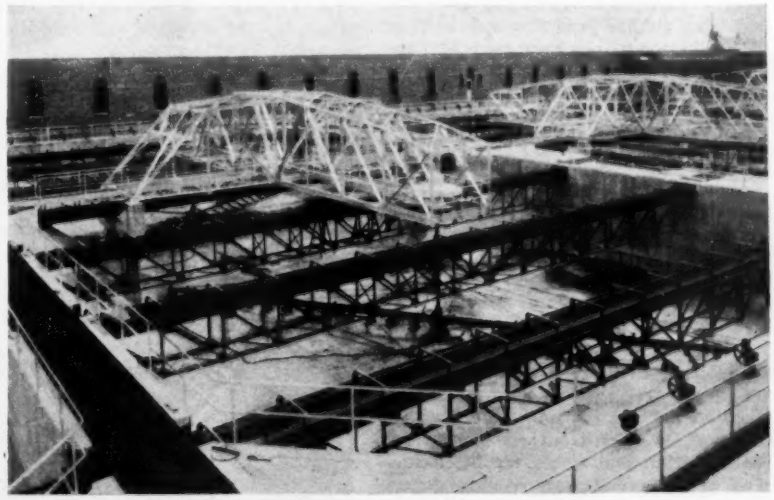


FIG. 3—TWIN SETTLING TANKS with surface-skimming weirs are rectangular in shape and have no center dividing wall. Two vacuum nozzle-type sludge removers are so placed that their circular paths overlap at the tank center.

Totalizing, indicating and recording instruments are provided in duplicate, as are also large dial indicators, one being located in the operating gallery immediately adjacent to the instruments, and the other in the office of the plant superintendent some 1,000 ft. distant. These dial indicators show total flow at any instant observed.

Two main operating galleries, one constructed above the main feed channels along the inlet ends of the aeration tanks, the other above the return-sludge channels, provide the necessary housing facilities for air piping, gate and valve controls and recording instruments for the measurement of aerated sewage and air. These structures are built of brick and have flat cork-insulated roofs, the doors and

ground to a smooth finish on the pipe interior. Lengths of 50 ft. were fabricated in the shop and then shipped to the site, where they were placed in position and field-welded. Throughout the length of the main there is a succession of anchorages and expansion joints, the joints being approximately 100 ft. apart with anchorages midway between.

Turbo-Blower Equipment—The initial installation of blower equipment, continuously operated since 1925, comprised four 30,000-c.f.m. units of the turbo steam-turbine-driven type. These units operate at a steam pressure of 225 lb. per sq.in. at the throttle and are capable of compressing air to 10 lb. per sq.in., the normal operating pressure ranging between 8½ to 9 lb. The new blower equipment is designed to operate under the above-noted steam and air-pressure conditions at a rated capacity of 50,000 c.f.m. Each unit is equipped with a surface-condenser pressure-oiling system and its full complement of necessary operating auxiliaries, one of the two units being equipped with facilities for bleeding steam to the plant heating system during the months when heating will be required. When the 1945 demand for air has been attained, 160,000 to 170,000 cu.ft. per min. may be supplied with adequate spare equipment in reserve.

As a means toward reduction of air-pressure losses due to friction, automatically operated check valves of the cone type have been selected to supplant the older type of multiple-disk valves installed in the blower discharge pipes originally; through the use of these valves the pressure drop represents a substantial percentage of the total air pressure carried. With the cone type of valve the full discharge pipe bore is available at all times while the blowers are operating. When a blower unit is taken off the line, the cone automatically reverses 90 deg. from its horizontal open position and closes the discharge pipe opening completely. Oil under pressure from the blower lubricating systems serves as the opening and closing medium for the valves connected to the two new blowers. Air pressure from the main line at 8½ to 9 lb. per sq.in. is contemplated for use as the valve-operating medium for the old 30,000-c.f.m. units.

Free air at atmospheric pressure entering the blowers, after being double-filtered first through oil filters and then through air filters, flows through 36-in. venturi meter tubes wherein the volume is recorded. This is practically the same arrangement that has been in use previously and has given satisfactory service in connection with the operation of the old 30,000-c.f.m. units.

Boiler and Stoker Installation—There are four 785-hp. boilers in the plant, which have served to supply the steam necessary for power generation, air compression and plant heating during ten years of operation. As the first step

FIG. 4—END SUPPORTS for shortened main trusses, showing solid concrete fillets shaped to the circular outline of the sludge-remover equipment.

in providing for boiler-plant extension, to accommodate future increased steam load, the matter of utilizing the present boilers to their fullest extent through operation at higher ratings was given considerable study. It was decided that the present boilers could be re-stokered and that an additional boiler of 1,000 hp. or more should be installed. These improvements will insure adequate steam-generating facilities for ten to fifteen years hence.

Sludge pumping and control

The return-sludge pumping equipment originally installed for the 85-

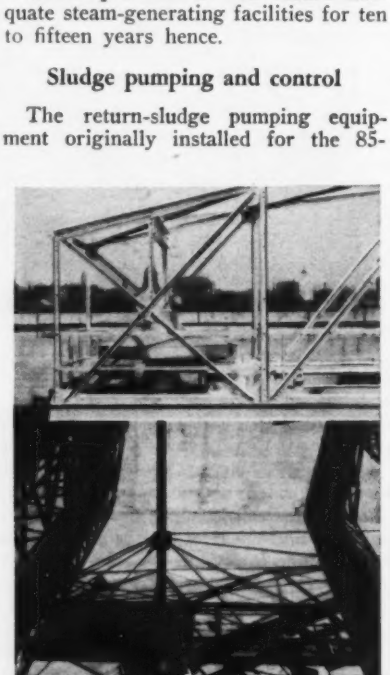


FIG. 5—RESTING on a lignum vitæ bearing, the sludge remover is rotated by a gear mechanism, which is supported on a cantilevered truss.

m.g.d. plant consists of four 24-in. vertical-shaft, open-impeller, slow-speed, motor-driven pumps of the centrifugal type. Each pump and motor is designed for pumping sludge at 6-, 9- and 12-m.g.d. rates. Adjacent to these pumps and suction well, which are located in the power house, there have been installed for the future sludge-pumping requirements three additional pumps of similar design and characteristics. Each pump is designed for 6-, 12- and 15-m.g.d. pumping rates; the suction and discharge pipes are of 20-in. diameter, and the maximum speed is 385 r.p.m.

Both sets of pumps will be served by one sludge-receiving and suction well, this well being the terminus of the new as well as the old return-sludge channels, and they will connect to the present 48-in. cast-iron-pipe sludge force main. From this main, in which is installed a venturi meter tube, sludge will be discharged into the old sludge and sewage mixing and main feed channel, as is being done at present. Through an extension which has been added to this channel, sludge will also be discharged into the sewage carried by the new main feed channels.

The volumetric proportioning of sludge to sewage in the feed channel supplying the old aeration tanks will be determined by metered volume difference and accomplished through the use of gate-valve controls installed in the main at the two sludge outlets.

Inasmuch as all sludge to be discharged from both the old and new sedimentation basins will be delivered to a single return-sludge pump well, common to both sets of tanks, the waste-sludge control tanks and facilities in use at present may be expanded to serve future requirements adequately. The control here referred to, which has been practiced since the old plant started operating in 1925, involves the isolation and separate manual control of aeration and specially arranged sedimentation tanks. Through these are passed daily a volume of mixed liquor (sewage admixed with activated sludge) containing all of the sewage solids to be removed from circulation and subsequently converted into fertilizer through dewatering and drying. This method of wasting sludge from the system possessed the important advantage of affording at all times the opportunity of varying and controlling sludge-solids concentration to conform to the frequent variation in dewatering characteristics. If the sludge to be wasted were taken directly from the return-sludge main, it is obvious that control facilities, as such, would be entirely absent.

Three rotary, coal-fired sludge dryers, 84 in. in diameter and 60 ft. long, were installed to supplement the old equipment, which consisted of six dryers of similar type and size and one unit of another type. With this added equipment and its necessary appurtenances,

it is estimated that 155 tons of sludge fertilizer (Milorganite) may be produced daily from the dryer plant as a whole, with adequate spare equipment in reserve.

Vacuum drum filters prepare the waste liquid sludge for subsequent drying by converting it from its liquid form (1.0 to 1.5 per cent solids) to a mechanically transportable sludge cake (15 to 20 per cent) solids. The present installation of 24 filters, each 12 ft. in diameter and 14 ft. in length, will remain adequate for some time to come, and no additions are contemplated for the immediate future.

Coincident with the installation of the three new sludge dryers, stack-gas deodorizing equipment was installed in the atmospheric vents of all the dryers. The equipment for each dryer unit consists of a venturi-shaped water-spray draft tube, followed by a nest of fin-cooling pipes and a water-spray scrubbing box. The function of this equipment is not only that of removing the fine particles of sludge dust in suspension, but also of effectively condensing the water vapor with which the stack gas is heavily laden. This latter feature will eliminate the formation of the voluminous clouds of steam which formerly floated in the atmosphere at various elevations, often enshrouding not only a portion of the plant in the vicinity of the dryer house but the navigable waters of the inner harbor as well.

There is in operation at this plant an installation for the dehydration and incineration of sewage screenings and grit, the dehydrators being horizontal centrifugal machines, the incinerators—two in number, rated at 18 to 20 tons per day each—being of the oil-fired no-grate type. To make the incineration department of the treatment adequate for a future period of ten to fifteen years, the installation of an additional 40-ton incinerator unit is contemplated. Work upon this installation may be undertaken within a short time. The improvement of grit-transporting facilities through the use of pneumatic ejectors is also contemplated as a part of the general plant expansion and improvement program. Grit at present is transported 900 ft. from the detritus chambers to the incinerator building through the use of a locomotive-crane-propelled open box-car. Pneumatic ejectors, centrally located over the grit chambers, and an underground pipe line extending to the incinerator building will supplant the present rather cumbersome and unsightly grit-removal facilities.

Expansion and improvement of waste-sludge-handling facilities is contemplated in order that additional waste sludge from an increased sewage volume may be treated. Besides providing for additional sludge-pumping capacity, it is planned to change from the present method of pumping after the sludge has been chemically treated and flocculated, to a method involving pumping first and adding chemical for pH correction afterward. This latter procedure has been shown through research work to offer substantial advantages tending toward economy in the use of ferric chloride. It is further planned to improve facilities for waste-sludge pH control through the reconstruction of the present sludge-detention and chemical-application tanks. While the changes contemplated involve complete new structures, the execution of the work may be so planned as to interfere little, if any, with the functioning of the present operation of the sludge-dewatering plant. This work is also scheduled for the near future.

Ground upon which the new tanks were constructed was reclaimed from the Lake Michigan shoreline immediately east of and adjacent to the site of the old tanks. The work of reclamation was accomplished through the construction of a watertight cofferdam enclosed by a concrete-capped double row of sheet-steel piling driven in a 15- to 20-ft. depth of water. The concrete capping, or superstructure, is substantially designed to serve the purpose of a mooring and loading dock for lake vessels.

A temporary pumping plant for dewatering the site was erected and was maintained in operation when necessary throughout the period of tank construction. The work of constructing the cofferdam, grading and filling of the site, driving the wood piling upon which the tanks are supported, diverting the effluent from the old tanks, constructing the new main outfall conduits, main feed channels and return-sludge channels, was completed under various contracts in advance of the award of the contract for the construction of the tanks and their adjacent channels.

Reinforced-concrete cantilever wall and flat-bottom slab design was employed throughout, the concrete (approximately 52,000 cu.yd.) having been mixed, transported and placed through the use of a central mixing plant, concrete pumps in duplicate, and the necessary pipe lines for conveying the concrete under pressure. The tanks were constructed by the G. R. Fehr Construction Co., of Milwaukee, the concrete pumping equipment furnished and operated by the Chain Belt Co., of Milwaukee.

All plant-extension work performed prior to the award of the contract for the construction of tanks, and as above enumerated, was financed from the sale proceeds of Metropolitan District general obligation bonds. The rest of the work performed to date and beginning with the tank construction contract has been financed by a federal loan and grant, the amount allocated for this purpose having been $1,850,000, the major portion of which has to date been expended.

James L. Ferebee, as chief engineer of the Milwaukee Sewerage Commission, is in direct charge of the work herein described. The late T. Chalkley Hatton, the writer's predecessor as consulting engineer, served the commission in a consulting capacity prior to his death, in November, 1933.

Chrome Copper Steel Used in Madagascar Suspension Bridges

THREE suspension bridges built since 1932 in the French colony of Madagascar are of particular interest by virtue of the use of a French steel of chrome-copper type. The steel was used in the floor and stiffening trusses of all three bridges and in the towers of two of the bridges; the tower of the third bridge is of reinforced concrete. The steel has a minimum yield point of 51,000 lb. per sq.in. and an ultimate strength of 77-91,000 lb. per sq.in. Specified elongation in 8 in. is 20 per cent. Chromium content varies from 0.40 to 0.60 per cent, while the copper content is from 0.30 to 0.60. Carbon is 0.15, phosphorus 0.07, sulphur 0.06, manganese 0.80, and silicon 0.17. The basic unit stress used was 27,000 lb. per sq.in. A total of 1,560 tons of steel was required for the three bridges.

Known as the Mananjary, Betsiboka and the Kamoro brides, the three structures have main suspended spans of 523, 453 and 677 ft., respectively. Each of the bridges provides a 9-ft. concrete-slab roadway and two 2-ft. sidewalks between the stiffening trusses. Open-type prestressed strand cables are used. The towers are of fixed-base type on the Mananjary and Betsiboka bridges and of rocker-type on the Kamoro bridge. The Betsiboka tower, 54 ft. high, is of reinforced concrete. The Mananjary and Kamoro towers, of structural steel, are 66 and 75 ft. high, respectively. All cables are fixed at the tower tops. All steel connections in towers and trusses are riveted, while the floor steel connections are arc-welded. The backstays of the Mananjary and Betsiboka bridges are unloaded, while on the Kamoro bridge only one backstay is loaded.

The facts presented above were made available by Joseph G. Shryock, chief engineer, Belmont Iron Works, Philadelphia, Pa., who took them from a paper presented to the Société des Ingénieurs Civils de France by Leinekugel le Cocq.

Modified Soil Control Proposed for Rolled-Fill Dam Construction

Experience with Proctor method of soil control on Sutherland Reservoir indicates some desirable changes to speed work without loss of efficiency

By Frank B. Campbell
Civil Engineer, Denver, Col.

TWO notable steps of advancement in the construction of rolled-fill dams have been made in recent years. The introduction of the sheepsfoot or tamping roller was the first definite improvement over the old technique of compacting with a smooth roller. The second was the scheme of control tests for rolled embankments, which included percolation, settlement and compaction, also plasticity needle tests. These methods, developed by R. R. Proctor (*ENR*, Aug. 31, Sept. 7, 21 and 28, 1933), have been used recently by several engineering organizations and, as may be expected, improvements in the equipment and method have been made. In the procedure of handling the control of the compaction of the embankments forming the Sutherland Reservoir of the Platte Valley Public Power and Irrigation District, near North Platte, Neb., Mr. Proctor's methods were utilized, and in their adaption to that job certain changes in detail were made which are believed to be an improvement.

In the latter part of the nineteenth century many small earth dams were constructed for western irrigation projects. Good results were obtained by driving herds of cattle or sheep over the dam during construction. With the advent of modern crawler tractors, the use of the sheepsfoot roller has become common. The early Rohl type roller had round knobs or balls on the ends of the feet. Most of the modern rollers are equipped with feet 7 in. long and flat on the bottom, but there are good reasons to believe that the original Rohl type was more effective.

The sheepsfoot roller requires more passes for full effectiveness than did the old smooth rollers. It has been the practice in recent years to build a test fill at the beginning of construction to determine the number of passes necessary to compact the available material. In such test work the fill is laid out in about five sections, and each section is given a different degree of compaction varying from eight to twenty passes. The fill should be built up five or six lifts high and the density measured 18 in. below the rough surface, since the full effect of the tamping roller is not found near the surface. It is usually found that the proper number of passes is between twelve and sixteen. Occasionally it is discovered that the roller is too light; in this event the weight can be increased by ballasting with inundated sand and gravel. It may be advisable to reduce the area of the feet. Recent specifications issued by the U. S. Bureau of Reclamation state that the face of each foot shall not be less than 4 and not more than 8 sq.in., and that the total weight of the roller in pounds divided by the total face area of all feet shall be not less than 12 sq.in. The function of the roller is to work or knead the soil particles so that the fines fill the voids between the larger sizes. The original Rohl type roller has the ability to penetrate more easily due to the round ball. For this reason it is probably more effective.

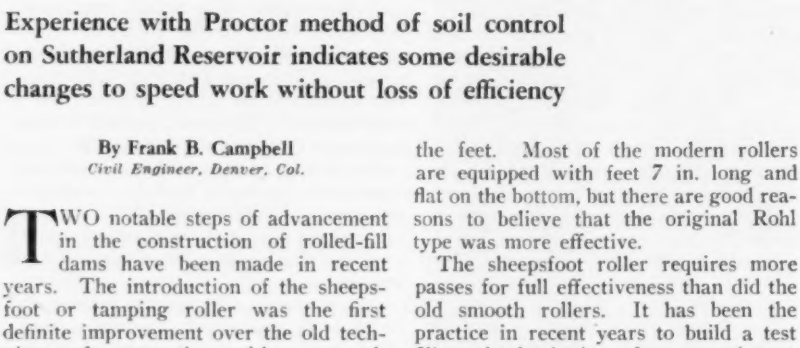


FIG. 1—A DISK HARROW drawn behind the sheepsfoot roller aids in distribution of moisture where sprinkling of the fill is necessary.

Since experience shows that better results can be obtained with thinner layers, specifications for modern earth dams call for the placing of material in layers with the compacted thickness ranging from 4 to 8 in. If the material is not sufficiently moist when placed, it is sprinkled. Some engineers prefer to add water on the embankment, using a hose. Others have found tank trucks of 1,000-gal. capacity to be a flexible type of equipment. One of the primary requisites to secure good compaction is to have uniform distribution of moisture throughout the lift during the rolling operation. For this reason natural moisture in the borrowpits or moisture that can be added in the pits is more desirable than moisture added on the fill.

Various methods for mixing water into the layer have been tried when it is found necessary to add water on the fill. For this a disk harrow drawn by a tractor has certain advantages. The Wheatland type disk is considerably better when properly used. In some types of soil it is found desirable to draw the harrow behind the sheepsfoot roller, though some contend that this practice destroys the compaction of the roller that has gone before. This is not necessarily the case, since the compacting effect of a sheepsfoot roller reaches 18 in. below the surface and the disk harrow penetrates only 5 or 6 in. The efficacy of this scheme in certain types of soils has been borne out by numerous density tests. This procedure also leaves a roughened surface for bonding with the next layer.

Soil compaction

In the series of articles referred to above, Mr. Proctor described the laboratory methods of compaction and discussed the dry density and plasticity curves. The curves shown in Fig. 2 were made in a cylinder with a removable collar and base plate similar to the one used by Mr. Proctor. The cylinder alone was 6 in. high, had a diameter tapering 0.2 in. outward from top to bottom, and an accurate volume of 0.05 cu.ft. The soil was compacted in the cylinder in three layers. Mr. Proctor used 25 blows for each layer but, as may be seen in Fig. 2, the density is only slightly less for twenty blows. Furthermore, there is considerably more efficiency from the operator's standpoint if a great number of compaction tests are to be made. Originally a "firm" blow with a 5½-lb. tamping rod was specified. The diameter of the tamping end of the rod is 2 in. For the Sutherland Dam tests the blow was standardized to that of the 5½-lb. rod falling 18 in., and to facilitate the work a cylindrical sheet-metal gage 18 in. long was set over the cylinder so that the rod fell 18 in. from the top of the tube to the

soil surface. It usually required from five to eight compaction tests in the laboratory to establish a single curve.

A marked improvement has been made in the Proctor plasticity needle. Instead of using the flat-end needle of cylindrical shape, unusual success has been achieved by using a needle with an ellipsoidal point. The needle used by the author has a point formed by a semi-ellipsoid, with the major axis twice the minor axis. The major axis coincides with the center line of the plasticity needle. The effective area of the needle is determined by using the minor axis as the diameter of the circle of pressure. Needles with areas of 0.05, 0.10 and 0.25 sq.in. were found most useful in the field control tests. These needles were designated Nos. 20, 10 and 4, respectively, and were made interchangeable. The original cylindrical pointed needle had the disadvantage of building up a compacted crust or layer under the point. The pressure would increase correspondingly until the needle broke through the layer. Consistent results could be obtained by any one operator only after he had become adept with its use. The advantage of the ellipsoidal point is that it "flows" smoothly through the plastic mass of compacted soil. The improvement has made the needle more readily adaptable to use by inexperienced inspectors.

The Proctor standard rate of ½ in. per second was adhered to in the Sutherland work. Marks on the needle 1 in. apart will assist the operator to become acquainted with the standard rate of penetration. The force required to cause the needle to travel at this rate is read in pounds on the shank of the piston that compresses the spring contained in the tube. The needle reading is expressed in pounds per square inch. A straight-line relation was found between the force required for penetration of the original cylindrical needle and that for the ellipsoidal needle. The reading of the latter is 0.8125 times the reading of the cylindrical needle.

Density and plasticity curves were made concurrently in the laboratory. A large pan of oven-dried material was used, and each moistened mix was prepared synthetically. The needle readings were made in the top of the cylinder after it had been weighed. As seen on Fig. 2, there is little difference between the needle reading using 20 blows per layer and that for 25 blows per layer. This was further reason for adopting 20 blows per layer as standard. The results are more consistent in the range of readings with moisture greater than that for maximum density. With moisture less than optimum, the readings will be high, although sometimes erratic. It is the writer's opinion that the curves of Fig. 2, other than the density and plasticity curves for 20 blows per layer, are unnecessary for field control tests, but they are presented as supporting data to the above.

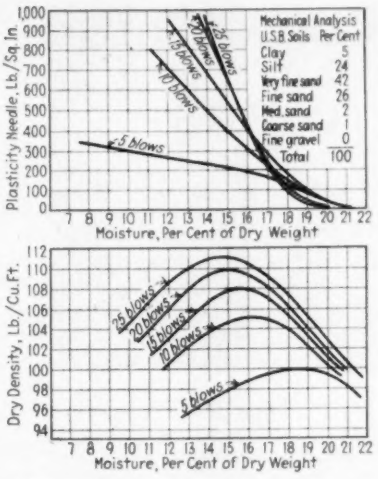


FIG. 2—TYPICAL compaction curves for very fine sandy material, showing that beyond 20 blows of the tamping rod there is little change in density, especially as measured by the plasticity needle.

The plasticity needle has its fundamental utility in the control of moisture in the embankment during construction. The curves shown on Fig. 2 will vary with different types of soil. Various soils require various optimum moistures. As some borrowpits contain numerous different types of material, it will be necessary for each inspector to become expert in soil classification if he is to estimate the moisture by needle readings. Interpolation from tables prepared in the laboratory is not highly practical. However, the exact moisture need not be determined on the job. The writer has found that if moisture is added until the needle reading decreases to a value ranging from 600 to 400 lb. per sq.in., results will be satisfactory. All such readings are made in the field compaction cylinder.

The inspector should be furnished with the following equipment:

One aluminum field cylinder with base and handle, one Proctor plasticity needle stock with cover, three ellipsoidal needles Nos. 20, 10, and 4, one box or pail for collecting the sample, one tamping rod, one tamping gage, one drain spade and one notebook.

The sample for the test should be taken from the top layer after it has been sprinkled or is ready for rolling. Care should be exercised in taking the sample to slice exactly through the top layer. The sample should be well mixed with the hands or through a piece of ¼-in. mesh screen. The material then is compacted in two layers with 20 standard blows each. Two layers should fill the cylinder two-thirds full. Needle readings are made in the top layer. An average of three readings should be taken and divided by the area of the needle used. If the soil, as compacted in the cylinder, shows readings between 600 and 400 lb. per sq.in., it has the proper degree of penetrability for compaction with the sheepsfoot roller.

The author has discouraged needle readings taken directly in the compacted fill, for the reason that too many variables are involved. Needle readings in the fill may be affected by a variable degree of roller compaction, a variable amount of truck travel or a variable water content.

The final criterion of a well-compacted embankment is the dry density in pounds per cubic foot as measured in place and compared with laboratory compaction. If the material in the borrowpits is fairly uniform, a standard may be set in the laboratory. If the material is variable, as is usually the case, a comparative compaction test in the laboratory may be made for each density measured in the fill. Dry density is used for comparative data.

Mr. Proctor described the dry-sand method of measuring density in place. There are several other practical methods. If gravel is absent, the cylinder method may be used. This is accomplished by driving a hollow steel cylinder into a leveled portion of the fill. The bottom end is sharpened, and the top, or driving end, has a heavy collar. The inside has a uniform diameter. The diameter can be chosen so that a volume of 1/30 cu.ft. is secured with a penetration of about a foot. The core then is removed by tapping the steel wall, and the sample is transported to the laboratory for weighing. By weighing before and after oven-drying the moisture content may also be determined. For further information on density measurements the reader is referred to a paper by A. S. Curry published in the *Journal of Agricultural Research*, June 1, 1931, pp. 765 to 772.

It is significant that the density found in the embankment is less than that found by compaction in the laboratory. This is usually the case because compaction in the fill is restrained by a plastic mass, while compaction in the laboratory is restrained by a steel wall.

The use of thin layers, the sheepsfoot roller, moistened earth and control tests have been shown to enhance results greatly when constructing a rolled embankment. If these measures are used, it is unlikely that there will be nearly as large a percentage of failures of modernly constructed earth dams as there has been in the past half century.

The author is indebted to his former associates, E. W. Lane, N. F. Crossley and L. W. Hamilton of the U. S. Bureau of Reclamation. He further expresses appreciation for the cooperation of the embankment inspection personnel of the Platte Valley Public Power and Irrigation District. The Platte Valley project is being carried out under the general direction of Donald D. Price, chief engineer and general manager of the district. Parsons, Klapp, Brinkerhoff & Douglas, New York, are consulting and designing engineers, with Eugene Halmos and H. A. Foster resident on the job.

Getting Results on a Large Relief-Works Program

Experience on Brooklyn Navy Yard projects shows that efficient production from relief labor is possible by sound organization, careful planning and eternal vigilance on the job

IN a $3,000,000 day-labor relief-works program of construction and repair under way at the Brooklyn Navy Yard, efficient production is being obtained from 2,300 relief workers through sound management, careful planning and scheduling of operations and constant check of performance and progress. The success of the program, which involves ten projects of improvements to the shops and industrial facilities of the yard and a considerable volume of deferred heavy maintenance and badly needed repairs to utilties, railroads and streets, is attributed to the attitude of the management that here is a *works* program, and not merely a *relief* plan. Except for the cooperation afforded by navy yard officials, navy construction engineers and other regular purchasing and accounting departments, the program is being conducted by civilians recruited from relief and unemployed lists. A civilian long experienced in construction is project works manager.

The various works were planned and developed with the cooperation and general supervision of navy officials, by a design department staffed with competent and experienced engineers from the unemployed list. Field operations are under the direction of capable construction men, many of them formerly associated with some of the country's largest contractors.

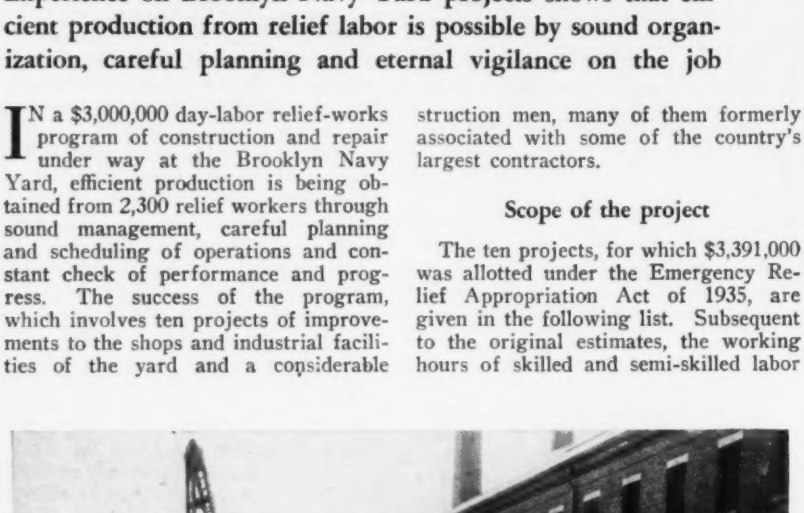


FIG. 1—HEAVY CONSTRUCTION on Brooklyn Navy Yard WPA program includes pile foundations for a new shop building. Hand labor is dovetailed with use of heavy equipment.

Scope of the project

The ten projects, for which $3,391,000 was allotted under the Emergency Relief Appropriation Act of 1935, are given in the following list. Subsequent to the original estimates, the working hours of skilled and semi-skilled labor were greatly reduced without a cut in monthly pay, thereby increasing the cost of the work. Some curtailment of the original program has been necessary to meet the increased costs.

1.	Repair and improvement of steam, compressed-air, water and street-lighting systems..	$414,000
2.	Repair and improvement of buildings	$1,780,000
3.	Improvements to power, heating and refrigerating plants.	$36,000
4.	Repair and improvement of waterfront structures	$147,000
5.	Revamping inside lighting and power circuits	$149,000
6.	Revamping the plumbing and ventilation systems	$105,000
7.	Rebuilding railroad tracks and yards	$160,000
8.	Rebuilding streets and walks	$150,000
9.	Foundation exploration and subsurface surveys	$25,000
10.	Completion of relief-works projects already under way (interior painting of shops, renovation of rolling stock, office furniture, minor building repairs, etc.)	$425,000

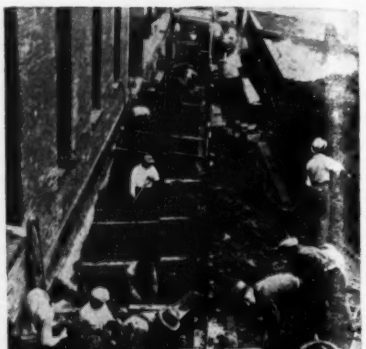


FIG. 2—AN IDEAL hand-labor job is that of excavating a footing trench requiring heavy sheeting and bracing alongside an old building.

The major item of work in the program is the rearrangement and improvement of shops and industrial facilities to increase the efficiency of the yard as a ship-building plant. For example, two shop buildings are being connected by an addition and are being altered and rearranged to permit the consolidation in the resulting large building of two shops now widely separated, which can be more efficiently operated as a single unit.

In addition, a considerable volume of deferred maintenance work is being undertaken. For years naval appropriations have been inadequate to maintain the shore establishments in the condition desired by the Navy Department. At Brooklyn, as well as at many other yards, funds have been insufficient to maintain the extensive Navy Yard facilities in full repair. Many of the buildings are very old, and some have deteriorated, in spite of all repairs that could be made with funds available, to such an extent that their usefulness has been impaired. Water, steam, electric and compressed-air distribution systems were in need of extensive repairs. Many pavements, railroad tracks and craneways were similarly in need of complete rehabilitation to make up for deferred maintenance.

The work involves many types of construction and repair, offering a great variety of employment. Included are streets, sidewalks, sewer and building construction, repairs to steam, water, air and power systems; repair of railroad track and a complete rebuilding of railroad rolling stock; painting and skylight repairs, building alterations and shipway repairs. One project is for a complete subsurface survey of foundations, utilities, pipe lines and sewers.

Classes of work include brick and stone masonry, demolition of buildings, excavation, piledriving, concrete construction, carpentry, pipe laying, painting, bituminous pavement construction and brick and asphalt block laying.

Origin of projects

With the advent of the current national relief-works program, the commandant of the Navy Yard recommended the yard projects to the Bureau of Yards and Docks for relief labor work. The Bureau in turn recommended a long list of projects to WPA, which finally allotted funds for the definite projects listed above.

For some time a small program of relief-work (under CWA and ERB) had been carried on at the yard. For this work a small designing organization had been created. This group worked up preliminary plans and cost estimates for the new program upon which allocations were made and served as the nucleus of a much larger design organization set up immediately to work out detail designs.

The funds allotted to each project were split into three main items, and the specific amount allocated to each item cannot be exceeded. First of all, a sum was set aside to cover what might be termed overhead. The allocation of a certain percentage of this overhead budget to each project constituted the first item of expense. The second item includes miscellaneous tools, consumable supplies and rental of equipment, the last being furnished for the most part from regular Navy Yard sources. The third item is for direct labor and materials, comprising the balance of the project allotment.

The larger projects were divided into subprojects, where division was logical according to type of work or by other classifications. The amount of money allotted for each subproject cannot be exceeded unless there has been a saving in some other subdivision of the same project. Funds are not transferable between projects.

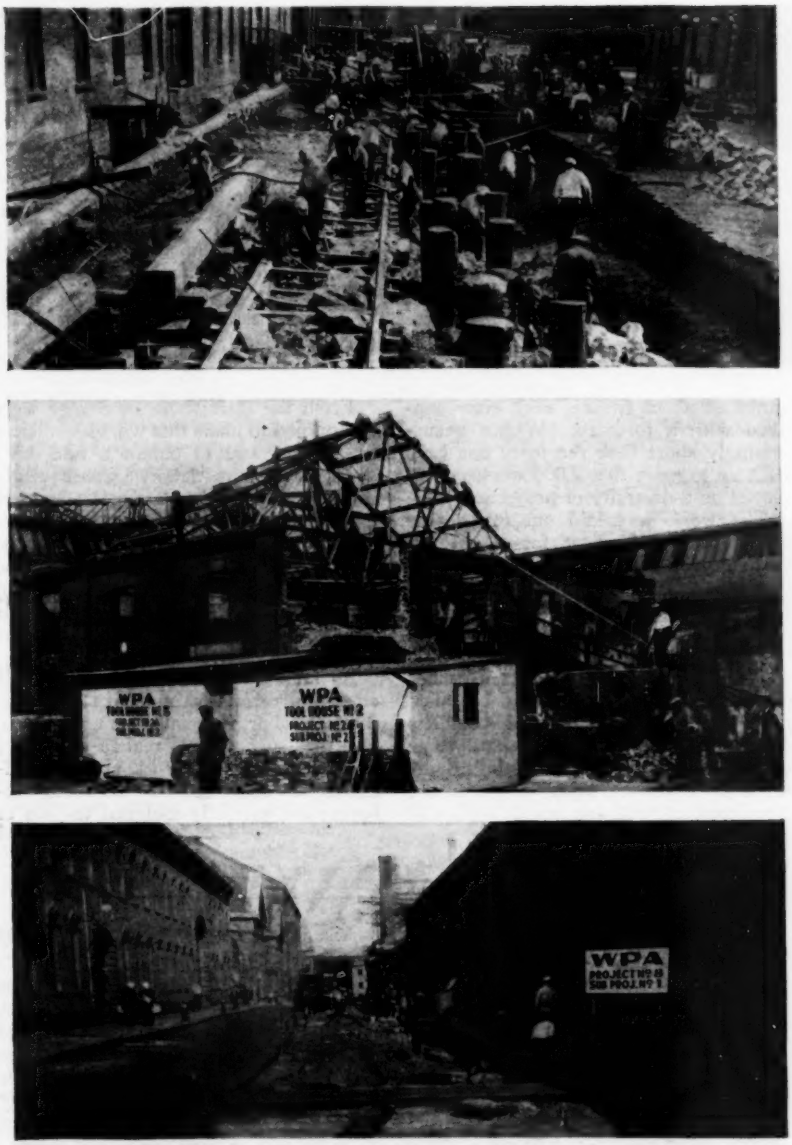


FIG. 3—THREE TYPES OF CONSTRUCTION typical of the navy yard work. Top—removal of old street and railroad tracks and preparation of new shop-building foundations. Center—demolition of an obsolete building. Bottom—repaving a yard street.

Labor conditions

All of the labor required is requisitioned through the U. S. National Reemployment Office, the class or trade of labor desired being specified in the requisition. Labor is, in general, recruited from relief rolls, but exceptions have been made in certain supervisory, technical and skilled classifications. Using Dec. 19 as a typical example, total employment on that date was 2,304, divided as follows: superintendents, engineers, clerical, etc., 348; skilled labor, 1,045; semi-skilled, 288; and unskilled, 623.

Wages are all on a monthly basis, with no deduction for lost time not the fault of the worker. Monthly earnings vary from $60.50 for unskilled labor to $93.50 for the highest skilled classification. The number of hours worked per month varies with the labor classification. The supervisory, technical and clerical force works 39 hours per week; unskilled forces work 120 hours per month; certain semi-skilled trades work 80 hours per month; and all skilled trades work 60 hours per month. The reduction in hours for certain trades resulted from the recent WPA capitulation to the demands of organized labor in New York that "prevailing" hourly rates be maintained on relief work.

A systematic arrangement of working hours has been worked out to meet the various labor conditions. The regular working month has been divided into four weeks of five six-hour days each. When Saturdays, Sundays and holidays are insufficient to reduce the number of working days to twenty for any one month, additional non-work days are arbitrarily designated. Unskilled labor works every working day, or 120 hours per month. The skilled and semi-skilled classes have been divided into two shifts, working alternate weeks for a total of ten days per month. The 80-hour-per-month classes work an extra two hours per day, or eight hours ten days per month. This system has eliminated most of the confusion resulting from variable shift changes, but it has not eliminated the loss of efficiency from long lay-offs between working periods.

Job organization and cost keeping

At first the design department was rushed, and as fast as detailed drawings were turned out for a project or subproject, men and materials were requisitioned. Workmen were organized into

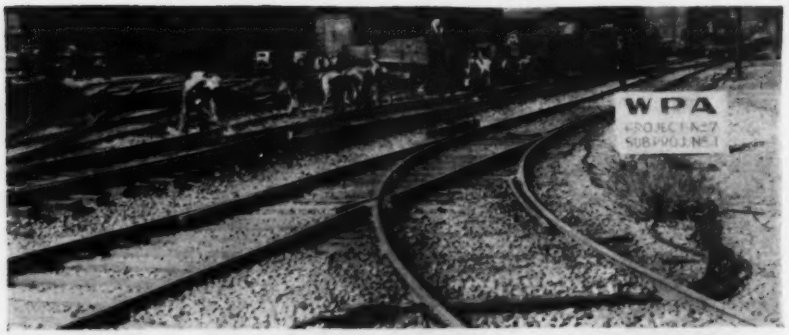


FIG. 4—RECONSTRUCTION of miles of railroad is one of the major projects.

gangs of about twenty, each crew supplied with a foreman. Within a surprisingly short time the force has been built up to more that 2,000 workers employed on a diversity of projects.

The work was laid out to provide continuous employment for a uniform size force of about 2,200 from its inception in August, 1935, to about March 1, 1936, and from then on for an augmented force to permit completion of work by July. Projects requiring little design and those left over from earlier relief work were started first. Other projects were delayed until complete designs could be prepared, and some were purposely held up to take up the slack later on as other projects are completed.

From the start those in charge were determined to make this work as efficient as possible and to obtain a fair day's work from the labor. Consequently shirking and loafing are not tolerated. Skilled and semi-skilled workers are requisitioned for definite tasks. If the individual supplied for a job is found to be incapable of filling it, he is sent back to the employment office, for misfits are regarded as a drag on the remainder of the crew.

As far as possible a tolerant attitude on output rate is maintained toward the common labor, especially the newcomers, for the supervisors realize many of those reporting for work are inexperienced in construction. Incoming laborers are carefully assigned to jobs to which they seem best suited. An inspection of the work reveals that the husky are found in the concrete and excavation crews, or on piledriving gangs, while the light-weights and older men are assigned to cleaning brick and to other lighter tasks. In contrast to much relief work, individual workers are placed where they produce best, and are not merely put to work. The physically unfit and those showing no disposition to work are returned to the re-employment office.

Timekeeping and cost-keeping procedure is similar to that on any well-managed construction job. Each workman is given a daily time card, which is punched at clocks set up for every subproject. The cards are signed by the foreman, who checks the labor cost distribution with the timekeepers. Four field checks daily are made by the timekeepers. Daily cost records for both materials and labor are compiled, showing the total cost to date and the unexpended balance for every project and subproject.

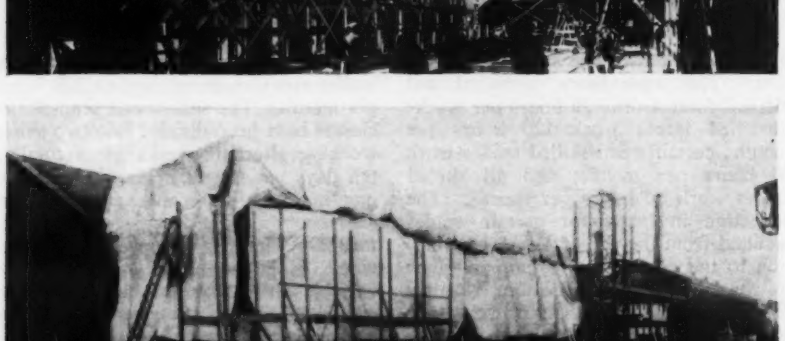


FIG. 5—TWO BUILDING PROJECTS. Above—an old three-story warehouse is being transformed into a heavy shop building by dropping the roof trusses one story, clearing out the second floor and installing a craneway. Below—cold-weather construction of an extension to an existing building.

Safety measures

Safety in construction of the projects is regarded as an important feature, especially in view of the large percentage of inexperienced workers in the unskilled class. All safety work is under the direction of an experienced safety engineer, who is given authority to enforce safe practices and methods. Scaffolds, ladders, shoring and pit and trench sheeting must be built to required standards. Goggles must be worn by operators of concrete breakers and chipping hammers.

A weekly inspection is made of all rope, cable, slings, chains, blocks, scaffolds and ladders in use. All workers come under the regular government employee compensation coverage. Remarkably low accident records are being maintained, as is exemplified by the experience for the month of October, when 2,074 employees working 191,814 hours had only eight lost-time accidents resulting in a total of 47 lost days. The safety record reflects the careful attention that has been given the work by the superintendents and general foremen at all times.

Directing personnel

Admiral Yates Stirling, Jr., commandant of the Brooklyn Navy Yard, is WPA state administrator of naval projects, assisted by Capt. C. A. Dunn, manager of the yard. Capt. A. L. Parsons (CEC), public works officer of the Brooklyn yard, is project manager of navy yard projects, assisted by Commander W. M. Angas (CEC), relief works superintendent, and Lieut. A. D. Hunter (CEC). Capt. J. N. Jordan (SC) is in charge of all accounting. A. J. Brehm is works manager, in charge of all the construction and civilian personnel.

Emergency Roadbuilding

An official appraisal of the values created through the emergency highway construction work of the five depression years in terms of mileage, kind of road built and comparative cost

Thomas H. MacDonald
Chief, Bureau of Public Roads, Washington, D. C.

IN THE unemployment emergency of the great depression the people of the United States called on roadbuilding to maintain and increase employment and appropriated large sums for the purpose. How has the highway art discharged this trust?

In specific terms, the chief of the Bureau of Public Roads gave the answer before the American Road Builders Association on Jan. 21. His paper, here published in slightly condensed form, records the large additions made to our highway transportation network through the emergency expenditures. Gains in secondary road improvement are distinguishing feature of the period. The efficiency of the work is shown by its low cost and by notable increase in quality standards.

—EDITOR.

BECAUSE of the public importance of road construction and the large amount of emergency funds appropriated for it during the last five years as part of the battle against unemployment, it appears important to present a concise review of highway progress covering a number of years, to record the facts and develop the main trends. In this review the five-year average of the period 1925-29 will be taken as representative of highway improvement work prior to the depression.

Dollars and miles

The base period 1925-1929 shows an average annual completion of 17,577 miles without and 10,063 miles with federal participation, a total of 27,640 miles. The succeeding five-year period, 1930-1934, shows an average annual completion of 22,068 miles from state funds (in some states increased through loans and grants by the PWA and also by support from the FERA), and in addition an average annual completion of 15,514 miles, with the whole or part of the cost met from federal highway funds administered by the Bureau of Public Roads, a total average annual completion of 37,582 miles. This is nearly 10,000 miles per year above the preceding five-year average.

These averages, however, fail to show the major influence of the public-works appropriation of June, 1933, and succeeding federal appropriations. For the two years 1933-1934 state work dropped to 15,963 miles per year, while work administered through the bureau rose to 20,048 miles per year, making the total annual completion 36,012 miles. A similar relation may be expected to hold for 1935 and 1936 when the figures become available. Thus, for the four-year period 1933-1936, federal appropriations for highways are the major influence in holding roadbuilding well above the average for the pre-depression base period.

Essentially the same story is told by a study of highway funds. In 1934, for the first time since the original federal-aid act of 1916, the federal contribution for construction rose well above that of the states. This will undoubtedly also be true for the two-year average of 1935 and 1936. The following averages show the trend:

STATE ROAD EXPENDITURES, ANNUAL AVERAGES
(Millions of Dollars)

	1925-29	1930-34	1933-34
State funds	$367	$403*	$234*
Federal aid	82**	192**	257**
	$449	$595	$491

*May include some federal grants from PWA or Relief Administration.
**Includes only funds administered through Bureau of Public Roads.

State expenditures for maintenance, equipment, interest and miscellaneous were:

STATE MAINTENANCE EXPENDITURES, ANNUAL AVERAGES

Base period	$225,700,000
Five-year period 1930-1934	258,700,000

The 1934 figure was $293,400,000, an amount $34,700,000 higher than the average for the five-year period and $74,200,000 higher than for the previous year.

Local government expenditures on roads (both construction and maintenance) were:

LOCAL ROAD EXPENDITURES, ANNUAL AVERAGES

Five-year base period	$615,700,000
Five-year period 1930-1934	528,800,000
Two-year period 1933-1934	388,000,000

Types of road built

During the five-year base period the net progress on the state highway systems in the construction and reconstruction of surfaced roadways was 42,575 miles of low-type and 33,640 miles of high-type; the total of 76,215 miles represents an average annual net increase of 15,243 miles. For the five-

TABLE I—STATES ROADBUILDING BEFORE AND DURING THE DEPRESSION PERIOD

	Without Fed. Aid, Miles	With Fed. Aid, Miles	Total Miles
1925	12,152	11,000	23,152
1926	15,830	10,722	26,552
1927	16,502	10,220	26,722
1928	19,496	9,756	29,252
1929	23,904	8,618	32,522
5-yr. aver.	17,577	10,063	27,640
1930	24,844	10,433	35,277
1931	28,634	16,000	44,634
1932	24,933	11,038	35,971
1933	14,926	18,545	33,471
1934	17,001	21,552	38,553
5-yr. aver.	22,068	15,514	37,581

TABLE II—ROADBUILDING EXPENDITURES BEFORE AND DURING THE DEPRESSION PERIOD
(Millions of Dollars)

Year	—State Funds— Con-struct.	Maint. etc.	Fed. funds	Local funds	Total Annual Aver.
1925	$297.1	$208.6	$92.2	$543.5	.....
1926	277.0	219.8	79.2	587.7	.....
1927	324.1	236.3	80.2	643.4	.....
1928	457.2	221.3	80.8	659.2	.....
1929	479.8	242.5	77.6	644.8	.....
5-yr. aver.	$367.0	$225.7	$82.0	$615.7	$1,290.4
1930	$620.7	$266.9	$92.5	$700.5	.....
1931	512.9	248.6	218.1	637.2	.....
1932	414.6	265.3	136.9	530.1	.....
1933	266.3	219.2	180.6	413.8	.....
1934	203.2	293.4	334.5	362.3	.....
5 yr. aver.	$403.5	$258.7	$192.5	$528.8	$1,383.5

TABLE III—LOCAL ROAD MILEAGES

Year	Total Surfaced, Miles	Low Type, Miles	High-Type, Miles
1925	376,406	348,409	27,997
1926	387,005	357,967	29,038
1927	412,155	380,358	31,797
1928	432,999	398,813	34,186
1929	454,111	416,770	37,341
5-yr. aver.	412,535	380,463	32,072
1930	467,338	425,742	41,596
1931	587,028	541,614	45,414
1932	595,999	549,767	46,232
1933	642,423	594,403	48,020
1934*	672,254	628,666	43,588
5-yr. aver.	593,008	548,038	44,970

*Seven states estimated.

TABLE IV—SECONDARY ROADS UNDER STATE CONTROL

Year	Total Surfaced, Miles	Low-Type, Surfaced Miles	High Type, Surfaced, Miles
1932	5,576	4,543	1,033
1933	38,648	36,440	2,208
1934	57,077	55,166	1,911*

*Decrease from 1933 is due to miscellaneous adjustments in state records.

TABLE V—EXISTING STATE HIGHWAY MILEAGES

Year	Total Surfaced, Miles	Low Type, Miles	High Type, Miles
1925	144,854	96,505	48,349
1926	163,059	109,110	53,949
1927	176,566	116,427	60,139
1928	193,138	124,765	68,373
1929	208,324	133,211	75,113
5-yr. aver.	177,188	116,003	61,184
1930	226,772	142,659	84,113
1931	242,700	146,359	96,341
1932	260,484	151,782	108,702
1933	271,845	157,995	113,850
1934	288,988	179,034	109,954*
5-yr. aver.	258,157	155,565	102,592

*Drop in high-type mileage due to resurvey of Texas system, as a result of which approximately 6,000 miles previously reported as bituminous macadam were assigned to the lower types.

year period 1930-1934 the corresponding net increases were 45,823 miles of low-type construction and 34,841 miles of high-type construction, the total of 80,664 miles representing an average annual net increase of 16,133 miles.

On the face of these figures, the first five years of the depression produced 4,400 miles greater net increase in surfaced roadways than the preceding five years of prosperity. Actually, the real gain was much larger, in part due to a more accurate classification of types, and in part to a marked advance in the standards of design and construction.

The total surfaced mileage on secondary roads under state control increased 51,500 (Table IV), but the most striking change is the accelerated local-road surfacing. During the five-year base period 1925-1929 surfacings were increased by 99,530 miles of low-type and 15,022 miles of high-type roadway. For the five-year period 1930-1934 there was an increase in surfaced mileage of 211,900 miles low-type and 6,247 high-type roadway, a total of 218,000 miles, or nearly double the increase in the preceding five-year period. This reflects both increased support for local roads from the road-user revenues (gas and motor-vehicle taxes) and work made possible through loans and grants from the PWA and large support from the FERA and the federal agencies established to provide employment. During the period that the greatest increase in road mileage took place local revenues from local sources decreased materially.

As an illustration of the build-up of the large highway construction programs and the different types that constitute the program, Table VI is submitted. This program has been financed for the major part from federal grants with minor participation by the state, and differs from previous federal-aid programs in that about 25 per cent of the funds was used for improvements of secondary roads, 25 per cent for municipal improvements and the remaining 50 per cent on the rural federal-aid system. The large mileage of gravel surfacings reflects the improvement of secondary roads.

Lower cost and higher quality

As an indication of the method of carrying out the federal highway work, the division of expenditure and mileage for the period up to Dec. 31, 1935, may be cited. A mileage of 31,900, covering 12,165 projects and costing $558,342,000, was done by contract. Against this, only 3,235 miles, covering 1,703 projects costing $36,131,000, were built by force-account. Thus, force-account projects constitute so small a part of the program as to dispel any real cause for valid criticism from the contracting industry. The fact should be further noted that most of the projects included in the force-account program are for secondary-road construction, where the individual projects are small and hardly suitable for contracting. There has been only one instance where force-account has been carried on by the state beyond reasonable limits, and this policy has since been abandoned.

The relative average prices for road construction have been calculated by using a composite mile made up of the different units of work in proportion as these were used in the total program. The composite mile at the prices bid for the five-year base period, 1925-1929, gave a cost of $17,026. If this is taken as an index 100, the index dropped sharply for 1932 to about 60 per cent; it rose in 1933 to an average of 74 per cent; it continued slightly upward in 1934, and for 1935 leveled off at about 80 per cent. We would therefore at this time be paying 80 per cent of the cost in the prosperity period if it were not for the factor of changes in design.

There has been a gradual increase in the number of units of construction used, through design changes to pro-

TABLE VII—SUMMARY STATUS OF HIGHWAY PROGRAMS FROM $400,000,000 PUBLIC WORKS FUND and $200,000,000 HAYDEN-CARTWRIGHT ACT FUND

	Contract Only			Force Account Only		
	Estimated Cost, Thousands	Mileage	No. of Proj.	Estimated Cost, Thousands	Mileage	No. of Proj.
Approved	$29,135	1,349	585	.....	.....	.....
Contract Awarded	32,374	1,880	697	$1,137	88	97
Under Construction	128,124	3,295	2,062	9,685	828	253
Completed	297,607	17,750	6,395	22,762	2,476	939
Total	$497,240	27,062	9,739	33,584	3,393	1,389
	Week Ending Dec. 31, 1935					
Total	$558,342	31,900	12,165	$36,131	3,235	1,703

TABLE VI—HOW EMERGENCY ROAD FUND WAS APPLIED

Road Projects Handled by Bureau of Public Roads With 1934 Public-Works Fund of $400,000,000 and Hayden-Cartwright Act Fund of $200,000,000; Figures as of December 31, 1935

Types	1933 Cost in Thousands	1933 Miles	1933-1934 Cost in Thousands	1933-1934 Miles	1933-1935 Cost in Thousands	1933-1935 Miles
Graded and drained	$32,170	4,149.0	$54,503	6,561.5	$59,322	6,969.8
Sand clay, untreated	2,708	569.9	3,546	975.6	4,289	1,155.5
Treated	4,205	557.7	9,199	1,048.4	10,861	1,199.0
Gravel, untreated	32,646	4,973.5	66,077	9,351.7	80,940	11,121.9
Treated	12,038	1,317.7	13,012	1,291.6	16,540	1,776.3
Macadam, untreated	2,312	203.8	2,145	208.1	2,303	179.4
Treated	3,877	238.5	12,932	867.1	15,275	991.5
Low-cost bituminous mix	15,918	1,801.1	29,716	3,232.6	35,801	3,739.7
Bituminous macadam	10,248	461.1	20,407	1,006.5	21,812	1,051.4
Bituminous concrete	22,806	706.0	46,324	1,328.1	56,398	1,655.3
Portland cement concrete	91,418	2,520.9	163,522	4,297.9	190,474	4,947.9
Block	4,509	63.0	9,699	121.9	11,417	140.5
Bridges and approaches	32,262	72.2 (2,431)	69,426	124.9 (5,055)	82,730	154.9 (5,767)
Grade-separations, R.R.-Hy.	5,811	12.1 (150)	24,509	39.2 (524)	33,634	51.8 (675)
Grade-separations Hy-Hy	704	.5 (9)	2,827	1.4 (49)	3,702	1.9 (69)
Miscellaneous	216		2,977		7,096	
Total	$273,848	17,647.0	$530,824	30,456.5	$632,594	35,136.8

Note: The figures in parentheses indicate the number of structures.

vide better and safer highways, so that about 42 per cent more units are being used per mile of standard highway construction than for the base period. Since the price index stands at 80 per cent, the cost of the very much better designed and constructed highways has increased to only 114 per cent.

Future prospects favorable

The opportunity is now presented for one of the largest annual construction programs we have ever had. A summary of the federal appropriations available to the states for construction during 1936 amounts to a total of $579,291,000. This summary is made up of balances of the federal highway grants and the regular federal aid funds for 1936, plus state funds that have been programmed. It includes:

Going contracts	$151,343,000
Plans approved, ready for contract	94,648,000
Funds available for new projects	333,300,000
Total	$579,291,000

Water Resources Problems Studied by State Planning Boards

STUDIES of water resources and their utilization prosecuted by state planning boards throughout the country have recently been summarized by the National Resources Committee under the title of "Water Resources Problems." Some notes from this document follow.

Recognizing a principle stated by the latter committee—namely, that drainage basins rather than states form the proper unit basis for an attack on water problems—many state boards pointed out that a program for the conservation of water resources can be successful only when properly coordinated and interrelated with plans for land use, forestry, health, recreation, game management, agriculture and soil erosion. But it was recognized that it is not always possible to serve all the different uses simultaneously. Their relative importance was well defined some years ago by the late Frederick H. Newell, then director of the Reclamation Service, as follows: (1) human consumption; (2) production of food (watering stock, irrigation and fish); (3) disposal of wastes; (4) industry (water power, steam power, and industrial processes); (5) transportation (navigation). To these the New York State Planning Board has added a sixth use—recreation.

Water-supply factors

Urban and rural water supplies for drinking purposes are under investigation by many of the planning boards, and it has been found that the critical problems of water supply lie largely in towns of less than 1,000 inhabitants. In Pennsylvania a study has been undertaken to determine the water-supply needs of each community for the next 25 or 50 years, in addition to a determination of the present needs and how they may be met. The protection of water used for municipal supplies and recreation is there held to be of vital concern. Progress in such protection is reported by Ohio, where rapid decrease in water-borne diseases (typhoid fever and dysentery) was found to be directly correlated with improvements in municipal sanitation. South Dakota reported that federal investigations of farm water supplies have shown three out of every four shallow wells to be badly polluted. Rural health officials were urged to make adequate tests of private water supplies and to advise rural citizens in matters of water supply, sewage disposal and household sanitation.

Hazards in stream pollution

Stream pollution resulting from raw or insufficiently treated domestic sewage and industrial wastes was recognized as a serious problem because of potential danger to health. Water-borne diseases are likely to be spread by the use of contaminated water for domestic purposes or irrigation, or for bathing, boating and fishing or the production of ice. Where dairy animals have access to polluted streams they may create a public health hazard by picking up disease-producing bacteria on their udders and bodies, whence they may later be transferred mechanically to the milk.

Aside from creating health hazards, stream pollution kills fish and other natural stream life and destroys recreational values. In New Jersey the interference of stream pollution with recreation is stated to be its most serious feature; for many miles the streams of that state are so badly polluted that all thought of their recreational use has long since been abandoned.

Practically every state planning board has given study to sewerage and sewage-disposal systems by means of surveys projected to determine the adequacy of existing facilities and the need for new plants. The New York Planning Board found that the waters of the state receive untreated sewage from population centers having 8,393,000 people. It was also reported that elimination of industrial pollution requires close cooperation with the industries in studying their waste-disposal problems and in assisting them to develop adequate treatment processes; in some cases the public interest will be best served by tolerating some of the pollution until reasonable methods of treatment are developed.

An individual problem of regional scope is that confronting many communities in Texas, where large quantities of salt water are brought to the earth surface by the drilling operations of the petroleum industry and must be disposed of; dilution in streams is not satisfactory.

Economics of flood control

A note of caution in building flood-control works was sounded by many of the planning boards that made economic studies comparing the cost of these works with the probable resulting benefits. In Kansas a flood-control program to cost nearly $12,000,000 has been proposed for one section of a river where the average annual flood loss does not exceed $450,000. The Pacific Northwest Regional Board suggested the possibility of zoning flood lands against uneconomic settlement and improvement in order to lessen flood damage and to do away with the necessity of constructing extensive protection works.

Groundwater studies were emphasized in a number of states where increasing pollution of surface supplies and receding water table have directed attention to development and conservation of future sources of supply.

Nile Dams to Be Replaced

THE Egyptian government has called for bids on the construction of two new dams, according to *The Engineer*, London, to replace the existing Mohammad Aly barrages in the Nile Delta region about 20 km. north of Cairo, where the Nile bifurcates and becomes the Rosetta and Damietta branches. *The Engineer* states that these dams will be among the most important works ever undertaken for the control of the River Nile. Their function will be to raise the level of the river upstream and to distribute the water of the Nile into three main canals—namely, the Behera Canal, which supplies water for irrigation purposes to the western portion of the delta, as far as Alexandria; the Menoufia Canal, to the central portion; and the Tewfiki Canal, to the eastern portion in the direction of Port Said. The new Rosetta barrage will have 46 openings, and the new Damietta barrage 34, each 8 m. in width, closed by heavy mild steel sluice gates operated by overhead power-driven machines. There will be a navigation lock in each barrage with a swing bridge to take vehicular traffic, the latter being provided for on the barrages by a wide roadway capable of accommodating two lines of traffic. The construction generally will be in concrete faced with granite procured from Aswan.

Roadbuilders Announce Platform of Public-Roads Management

Crowded program of seventy-five papers, largely reviews of practice or hortatory in character, lead up to a declaration of principle governing future highway development

ABANDONING APPEAL or protest by resolutions, the American Road Builders Association, in convention Jan. 20-24 at Cleveland, Ohio, wrote into its records a strong platform of purposes and policies that should govern public-roads management. Organizing under improved finances, the association will direct its affairs to increasing its membership and its affiliations for the purpose of advancing this platform. Briefly summarized, this platform sets forth the following doctrines:

I—The maintenance of an adequate highway system requires: (1) the determination of actual traffic requirements; (2) the planning, design and construction of highways that will serve this traffic with the highest overall economy and safety; and (3) the financing of these highways on a basis that takes into account as contributing beneficiaries *(a)* the general community, *(b)* the owners of land especially served or benefited, and *(c)* those who directly operate motor vehicles on the highways.

II—Every political subdivision having jurisdiction over public roads should ensure that its highway funds, especially license fees, gasoline taxes and other special-user imposts, are devoted exclusively to highway purposes.

III—Continuance of the established federal-aid program is essential because experience has demonstrated conclusively the value of federal coordination of highway standards and practice.

IV—States and other administrative subdivisions should assume as soon as possible their normal responsibility for highway improvement, but emergency federal appropriations should not be discontinued abruptly but should be reduced gradually as the various jurisdictions are financially able to assume their responsibilities.

V—In the interest of economy and efficiency all federal appropriations for highways should be administered by the Bureau of Public Roads.

VI—Immediate study should be undertaken to determine a sound and rational basis for extending federal aid to secondary highways and through streets, so as to establish standards of engineering and of administration comparable with those that have been developed through federal aid on state highways.

VII—The construction and maintenance of all highways should be intrusted only to competent and experienced highway officials and workers and should not be turned over to improvised organizations and to individuals without special qualifications for such work.

VIII—Highway improvements should be removed as quickly as possible from the position of an employment-relief measure using primitive methods and be re-established to employ modern construction methods and machinery.

IX—A major responsibility for the safety of motor traffic rests with those who provide the highways; many miles of existing highway now inadequate for modern motor traffic must be reconstructed and new highways built to higher standards.

X—In considering the effect of highway expenditures on employment full value should be given to labor employed in the production and transportation processes serving highway work.

This platform prepared by a committee representing all branches of the industry was adopted by the national highway advisory council of the A.R.B.A. and by the board of directors of the association.

Engineering advance reviewed

To consider the 75 papers, continuous simultaneous sessions were held by the county officials', city officials', educational and contractors' divisions in addition to the general technical sessions. Any summary beyond a mere listing of papers and authors must be limited to representative topics considered; in the engineering field these were pavement design, soil stabilization, expansion joints, surface improvement and basic planning.

Basic Planning—Three of the papers in this classification emphasized liberal right-of-way for width expansion; statewide highway inventory, traffic census and financial survey, and railway grade-crossing inventory and survey. Pointing out the unreliability of present knowledge of traffic trends, population movements and industrial developments as a definite guide in planning road-capacity requirements, M. W. Torkelson, Wisconsin Planning Board, urged that an expansion zone be provided by wide right-of-way. The acquirement of right-of-way can be undertaken without loss and even with profit and make it possible to expand capacity from two, to three to four lanes as and where such expansion is necessary. If it should develop that no expansion is necessary, the land is available for roadside development. Provision of right-of-way for road widening is far more rational planning than attempts to predict what traffic will be in the future from what it was in the past or may be now.

Commenting that arrangements have been completed by the Bureau of Public Roads and eleven states for state-wide highway planning surveys and that the work is in active progress in Pennsylvania, Missouri, Ohio, Illinois, Iowa, Kansas and Michigan, Prof. J. E. Kalfuss, Pennsylvania State College, described the order and procedure of the Pennsylvania survey operations, which are estimated to cost about $700,000. When the survey is completed Pennsylvania and the other states will each know (1) what it actually posseses in its physical property, (2) what its highway rolling stock consists of and whether the plant is being properly used or abused, (3) the financial and administrative structure affecting both highway plant and rolling stock, and (4) some considerations or conclusions as to the coordination of all the transportation agencies of the day in the state.

Considering the Missouri survey as it related to grade-crossings, R. B. Brooks, consulting engineer, stated that a virtually complete inventory of conditions and structures at every crossing would be made from which to appraise any further protective or remedial measures.

Soil Stabilization—Covering the two functional divisions *(a)* of stabilizing proportioned soil by excluding water and *(b)* of controlling the water content by salt admixtures, papers were presented by F. V. Reagel, Missouri highway department, and A. R. Smith, Indiana highway department. In particular Mr. Reagel brought out the new subterranean method or inverted oil-penetration method of asphalt stabilization first used for hauling roads in the western oil fields, then tried out in Missouri by A. F. Sachs, engineer of Jackson County, and later experimentally developed by the state highway department.

The methods in general is deposition of liquid bituminous material at the bottom of a scarified layer of earth or earth covered with a granular surfacing, followed by compaction to permit the oil to penetrate upward and diffuse through the mass. The equipment for application consists of a heavy frame with hollow teeth, which penetrate the soil 4 or 5 ins. and through which the bituminous material is pumped from a distributor and injected into the soil, which is then compacted under traffic or by rolling. Full penetration upward of the oil requires about two or three weeks. The result is a water-excluding base costing about $2,500 a mile, which requires only a light armor coat surface and offers the possibility of an economical low-cost road.

As the result of experience with stabilization, Mr. Smith said that Indiana had developed a system of stage construction consisting of a proportioned

soil base built in layers and salt-stabilized and of a bituminous carpet (or better) wearing course. Insistence that stabilization be solely a method of base construction was stressed. Full details of construction were given from which the following facts are selected as having been determined by experience:

(1) The plasticity index of mixes is being reduced to between 3 to 9, because with a bituminous carpet a high index (ordinarily 8-14) is likely to result in softening; (2) from examinations of roads in place it appears that 20 to 25 per cent of sand passing a 40-mesh screen works best; (3) because of the covering mat a reduction to 7 to 15 per cent of silt and clay is desirable; (4) as long as there is enough coarse material to provide body, precise grading is not of prime importance; (5) in compacting, usually ¾ to 1¼ gal. of water will give good results; (6) plant-mixed material is more easily placed and lessens danger of fat spots; asphalt pavers can be used for placing plant mix; (7) the ideal way of applying salt is as a saturated brine; in layer construction the adopted amount is ¾ lb. per sq.yd. per inch thickness; (8) in layer construction, a 3-in. course of loose material is wet with brine, rolled and allowed to season several days; (9) the more rolling the better; use plastic mix and a combination of dual-wheeled (for kneading action) and regular power roller; (10) any type surfacing can be used; for low-cost roads use a ¾-in. asphalt surface treatment on a light tar prime; (11) recut costs have been $6,000 to $7,000 a mile for 20-ft. road, 6 in. thick.

Pavement Design—Two papers, by F. T. Sheets, Portland Cement Association, and by Otto S. Hess, Kent County engineer, brought out the substance of recent development in pavement design and structure. Mr. Sheets epitomized his rational design procedure for concrete pavements outlined in this journal a year ago *(ENR,* Jan. 17, 1935, p .83), also published in book form by the P.C.A. Mr. Sheets considered that one of the most significant developments in highway thought and practice during the year had been the application of these design principles in actual construction.

Reporting for the committee on design and construction, Mr. Hess outlined present practice for concrete, brick, bituminous pavements and bituminous retread surfaces. A few of the facts brought out are: In *concrete* pavements, for center joints a groove joint fitted with a bituminous material, usually a premolded asphalt strip, is becoming more prevalent. There is a marked tendency toward slabs 90 to 100 ft. long with dummy joints at the one-third points. At present 31 states require a surface finish that deviates no more than ⅛ in. from a 10-ft. straight-edge. There is a marked increase in the use of bar mat or wire-mesh reinforcement throughout the slash. More real engineering is needed in the development of specific designs for specific jobs. In *brick* paving the present wire-cut, lug brick has a great non-skid factor over the smooth-surface brick formerly used. Bituminous mastic cushion and asphalt filler are nearly universal. One of the greatest improvements is removal of surplus filler by using a non-bonding wash on the brick surface. In *bituminous* pavements and retread surfaces, machine-finishing has been a particularly notable improvement.

Expansion Joints—Introduced by a general discussion by H. F. Clemmer, materials engineer, District of Columbia, papers were presented by manufacturers' representatives describing nine types and joint fillers. These joints and joint materials, made familiar by current trade literature, need not be reviewed. Points of experience noted by Mr. Clemmer are of interest. Starting with the premise that joint design for concrete pavement and concrete bases for other wearing surfaces require the same consideration, Mr. Clemmer evaluated temperature expansion, moisture expansion, shrinkage contraction and curling stresses as indicating the following conclusion: Spacing of 1-in. expansion joints 100 ft. apart will insure free movement of the slab, and properly spaced contraction joints (planes of weakness with provision for proper transfer of load) will control transverse cracking. But the wider the expansion joint the less efficient is dowel transfer of load, and it is desirable to reduce the joint to ½ in. and locate contraction joints close enough to limit slab lengths to 20 ft.

Surface Improvement—Surface improvement, both in non-skid properties and in smoothness, was considered in papers by Samuel Eckels, Allegheny County Authority, and H. S. Perry, Ohio Highway Department. Pointing out that the action of vehicle tires at present exerted a pulling-out action instead of an ironing-down action, Mr. Eckels emphasized the need of exceptional attention in developing a dense surface of non-skid texture in bituminous construction. This calls for a more exacting selection and proportioning of materials and more skilled construction operations. This last element was brought out by Mr. Perry in his paper on rolling. Most of the surface smoothness, density, texture and durability of a black-top surface depend on the rolling procedure and the rollers used, and these have to be adapted to the bitumen used, the aggregate, the weather and other construction by pure skill and judgment. In tools used Mr. Perry considered the most significant improvement of recent years to be the third axle roller.

Surety, insurance, federal control

In the ten papers presented at the two sessions of the highway contractors' division problems of construction had no place; surety practices, compensation insurance and federal regulation absorbed all the interest of the score or two of roadbuilders who tore themselves away from the exhibition of equipment. Surety and its service to contracting were briefly argued by S. M. Williams, Bureau of Contract Information. Milton Acker, Bureau of Casualty and Surety Underwriters, described the means and processes of fixing rates for contractors' compensation and liability insurance, and indicated the reasons for variations in rates. In two papers, Perry Fellows, Works Progress Administration, presented briefs for WPA farm-to-market road construction and equipment rental rules and policy.

The contractors' voice was heard clearly only in a paper on federal over-regulation of highway work by Frederick Hoitt, secretary, New England Road Builders Association. Reviewing in turn the relief-works regulation of wages, hours worked and use of equipment, Mr. Hoitt said: "Since there have been three different federal acts regulating highway work contractors have been confused how to go about estimating costs, and the conduct of work has been complicated beyond all previous experience."

Colleges can serve roadbuilding

The newly organized educational division of the A.R.B.A. made an active start in the convention work with a program of five papers on teaching, graduate employment and economic research by professors S. S. Sidenberg, Maryland; S. L. Conner, Tufts; W. S. Downs, West Virginia; J. B. Butler, Missouri School of Mines; W. J. Emmons, Michigan; and A. Diefendorf, Pittsburgh. In particular, Professor Downs gave a ringing call for a greater study of and research in highway economics. Stating that the justification of all highway work generally depends on economic considerations, he outlined directions to be taken in economic studies.

City and county ask federal aid

Planning, construction and financing drew about equal attention in the titles of the round score of papers presented at the separately held sessions of the city officials and the county officials. Financing, however, was the subject of outstanding interest and particularly a plan for extending federal aid to county secondary roads and to through streets in cities; as this action was called for in a plank of the adopted A.R.B.A. platform, its discussion is of importance.

Speaking in behalf of aid to cities, H. A. Yancey, city manager, Durham, N. C., discussed returns from a questionnaire received from 76 cities having an aggregate population of about 17,000,000. In respect to federal aid, 50 of the cities favored expenditure directly by

city authorities under the supervision of the Bureau of Public Roads, and 26 favored joint supervision by the state highway department and the Bureau of Public Roads. On this showing Mr. Yancey urged federal aid: (1) to provide funds to cities now destitute of road funds; (2) to coordinate city systems and road systems adjacent to cities, and (3) to put all city road construction under high standards of engineering and management.

Speaking of aid to secondary roads in counties, H. G. Sours, Summit County, Ohio, argued along substantially the same lines as to raising standards of engineering and management as did Mr. Yancey and outlined a general plan as follows:

It is a recognized fact that the general average of the character and efficiency of state highway work was greatly improved and standardized after federal aid to the states was set up and the work of the various states came under the direction and control of the Bureau of Public Roads. If regular federal aid should be distributed to the counties in a manner similar to that being followed in alloting federal aid to the states, the same effects would be felt by the county engineering departments. Some difficulty would undoubtedly be encountered at the start because of the fact that many counties would not have properly-trained highway organizations to handle highway work according to federal requirements. In those cases a plan could be worked out whereby such counties, if they desire federal aid, could request their federal work to be done under the supervision of the state highway department for a period of, say, five years, during which time they could set up and develop a satisfactory county department. This, however, should not be used to penalize those counties which do have efficient engineering departments at the present time.

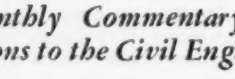
Miscellaneous subjects

Scattered through the sessions were a dozen or more papers on road-tax diversion, emergency financing and system planning, and at the Pan American session a series of papers on Mexican and Cuban highway development were presented.

The very important accounting by Thos. H. MacDonald, Chief Bureau of Public Roads, of federal emergency road expenditures is given at length elsewhere in this issue. Another important paper was an economic and statistical analysis of the industry and labor distribution of highway expenditures by T. Warren Allen, B.P.R.; this information has been recently published in pamphlet form and can be secured at nominal cost (15c.) from the Superintendent of Documents at Washington. Papers on road-tax diversion by Murray D. Van Wagoner, Michigan, and Roy Britton, National Highway Users Conference, were vigorous attacks on this practice.

Book Reviews and Notes

A Monthly Commentary on Current Additions to the Civil Engineer's Library



Construction of Steel Dams

STEEL DAMS—By Otis E. Hovey. Cloth; 6x9 in.; pp. 122; diagrams, photographs, formulas. Published by American Institute of Steel Construction, New York, N. Y. $2.50 plus postage.

DESIGNERS OF MOVABLE DAMS use steel widely and almost exclusively. Designers of fixed dams hardly give steel a thought. To demonstrate the fallacy of this paradox, the American Institute of Steel Construction engaged Otis E. Hovey to review the existing state of the steel dam art and to study and report on suitable methods of design. This book is the result. It lifts from the almost forgotten past a type of engineering structure that has been under a pall of misunderstanding since a foundation failure 30 years ago wrecked the Hauser Lake steel dam in the Missouri River near Helena, Mont. In addition to fixed steel-frame dams, chapters are devoted to fill dams with steel core plates, fill dams with steel face plates and dams with steel sheetpiling cutoff walls.

Manual on Report Writing

PREPARATION OF ENGINEERING REPORTS—By Thomas R. Agg and Walter L. Foster. Cloth; 5x7½ in.; pp. 192. Numerous diagrams and charts. Published by the McGraw-Hill Book Co., New York and London. Price, $1.75.

PRACTICING ENGINEERS, as well as the student engineers for whom it was primarily prepared, will find this manual on the preparation of engineering reports a convenient reference book and guide. In analyzing the basic elements of this specialized form of technical exposition, the author deals with content and form, points out the distinctive chararteristics and then outlines patterns of style and arrangement. Engineering reports have common characteristics, and although they may appear in many guises, they generally can be classified in two categories—the informal or letter type, and the formal report. Each of these is discussed fully in relation to accuracy, subject matter and conventional form. The function and design of form reports are also touched upon. Of particular interest are the sections devoted to outlining a systematic procedure for gathering data and factual material, the mechanics of arrangement for effective and convenient presentation and the preparation of illustrative material. A useful appendix is included which covers suggestions on style and recognized usage of punctuation and abbreviations.

Surveying

Reviews by Paul P. Rice
Instructor in Civil Engineering, Lafayette College, Easton, Pa.

PUBLIC LAND SURVEYS, History, Instruction, Methods—By Lowell O. Stewart. Cloth; 6x9 in.; pp. 200. Published by Collegiate Press, Inc., Ames, Iowa. $2.25.

STEWART'S "Public Land Surveys" is an interesting and valuable addition to surveying literature on a special subject heretofore largely neglected. In the first four chapters is traced the origin, enactment and development of the rectangular system of surveying, giving an interesting historical account. Much of the remainder of the book discusses public land surveys as related to resurveying these lands today. This is important, for a relocation of lines in the public domain must follow the original technique and instructions as far as possible. Recorded notes usually are insufficient, so it is necessary to refer to the original instructions published by the General Land Office. Six revisions of the Land Office Manual have been made with little or no regard as to the evolution of these regulations. Since copies of the earlier manuals are scarce, Stewart's numerous quotations of original instructions will be welcomed by the practicing engineer or surveyor in the public-land states, particularly those in the upper Mississippi valley and the Great Lakes region.

The hardships endured by the pioneer surveyors in midwestern states are described in Chapter Five, "Workaday Life of Early Surveyors." There also are references to William A. Burt, one of the best-known men who worked on public land surveys. The biographical sketch and account of his invention and development of the solar compass bearing his name are noteworthy.

* * *

MODERN SURVEYING FOR CIVIL ENGINEERS—By H. F. Birchal. Cloth; 6x9 in.; pp. 524. Numerous line cuts and halftone illustrations. Published by Chapman & Hall, Ltd., London, England. Price, 25 shillings.

INTERNATIONAL STUDENTS of surveying problems, teachers of surveying and others having an unusual interest in the

subject will find Birchal's book of value. The author has made a very commendable effort to make his work of maximum practical use. To this end he has described, analyzed and solved typical surveying problems as encountered on a great variety of construction projects, such as dams, docks, tunnels, railways, pipe lines, canals, bridges, viaducts and machinery installations.

Two chapters entitled "Photography for Engineers" and "Aerial Surveying" give valuable data on this increasingly important subject.

The volume will undoubtedly be received in Great Britain and some of her colonies as an outstanding surveying text and reference book. Unfortunately, the differences in surveying practice between Great Britain and the United States and Canada limit the book's usefulness on this continent.

* * *

A TREATISE ON SURVEYING—Vol. 1—By Reginald E. Middleton and the late Osbert Chadwick. Cloth; 5x8 in.; pp. 398. Tables, drawings. Published by The Engineers Book Shop, New York, N. Y.

THE DIFFERENCE IN STANDARDS, methods, instruments and terminology between England and the United States with regard to surveying theory and practice precludes the possibility of this work having any use as a textbook for students in this country. It is of value, as a reference to those especially interested in surveying. Worthy of special mention is the chapter by E. H. Sprague entitled "Historical," outlining the development of the art of surveying from the beginnings of civilization.

* * *

SURVEYING—By Harry Bouchard. Fabricoid; 5x8 in.; pp. 586. Maps, diagrams, tables. Published by International Textbook Co., Scranton, Pa. $3.75.

THIS BOOK will find some favor with engineers even before its contents are examined. The green cover, round corners and flexible bindings are pleasing and convenient features. Closer examination will reveal good paper, clear-cut well-drawn illustrations, and a refreshing absence of fine print or fine-print footnotes, so often forgotten or omitted by the student and difficult to read for the practicing engineer and surveyor who has already spent his day behind "the gun."

The book will find its chief use as a text in surveying courses taught primarily for civil and mining engineers and as a reference. The first seven chapters, covering fundamental theory and practice, are presented in splendid detail and logical sequence for this purpose. Subsequent chapters on curvilinear surveys, triangulation, topographic surveys, hydrographic surveys, earthwork, latitude, longitude and time, furnish sufficient material for additional courses.

Special mention must be made of the excellent chapters on adjustment of instruments, and the U. S. public land surveys. The latter should be well received by those engineers west of the Appalachians in or near the public domain.

The practicing engineer and surveyor will find numerous ideas presented that have not ordinarily been included in surveying texts.

Miscellaneous Notes on Booklets and Reprints

RECORDS OF THE FLOW OF THE RIO GRANDE and its tributaries are given in Water Bulletin No. 4, International Boundary Commission, El Paso, Texas. The bulletin also includes analyses of water samples, a record of the amount of water stored in the large reservoirs of the Rio Grande and information on the evaporation from free water surfaces in the Rio Grande valley.

NEW HARBOR WORKS at Halifax are described briefly in the 1934 annual report of the Halifax Harbour Commissioners. Shipping statistics are also included. Booklet available from the Halifax Harbour Commissioners, Halifax, Nova Scotia. Price not stated.

STRUCTURAL BEHAVIOR OF BATTLEDECK FLOOR SYSTEMS, a study made at Lehigh University in cooperation with the American Institute of Steel Construction, is summarized in a report of the first year's studies, published by the American Institute of Steel Construction, 200 Madison Ave., New York City.

New Books and Revised Editions

[Those desiring copies of the books listed below or mentioned elsewhere in this section should order them from the publishers or from their local booksellers.]

CROSBY-FISKE-FORSTER HANDBOOK OF FIRE PROTECTION—Eighth Edition. Fabrikoid; 4½x6½ in.; pp. 1,154; halftones, line cuts and tables. Published by National Fire Protection Assn., Boston, and D. Van Nostrand Co., New York. *. . . A complete revision of the 7th edition, published in 1924 with detailed treatment of new developments during the past eleven years.*

DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH (GREAT BRITAIN), REPORTS FOR 1933-34 and 1934-35—Paper; 6x9½ in.; pp. 185. Published in this country by British Library of Information, 270 Madison Ave., New York. Price 95c. each.

ELASTICITY—STRUCTURE AND STRENGTH OF MATERIALS USED IN ENGINEERING CONSTRUCTION—Part II—By C. A. P. Turner. Paper; 6½x9¼ in.; pp. 50; tables. Sold as an addendum to Part I without extra charge by A. C. McClurg Co., Chicago, or the author.

KEMPE'S ENGINEER'S YEAR-BOOK 1936—42d edition. Revised under the direction of L. St.L. Pendred. Leather; 4½x7½ in.; pp. 2,664; tables, diagrams, photographs. Published by Morgan Bros., Ltd., London. Price 31s. 6d. net in Great Britain. *. . . New material added this year includes a section dealing with acoustics, vibration and noise.*

NATIONAL PHYSICAL LABORATORY, Report for the year 1934—Paper; 8x10½ in.; pp. 260; illustrated. Published by His Majesty's Stationery Office, London. From the British Library of Information, 270 Madison Ave., New York, $3.50.

OUR ENEMY THE TERMITE—By Thomas E. Snyder. Cloth; 6x9 in.; pp. 196; photographs, diagrams, maps. Published by Comstock Publishing Co., Ithaca, N. Y. Price $3.

THE PORTS OF NORFOLK, PORTSMOUTH, NEWPORT NEWS AND HAMPTON, VA.—Port Series No. 15, Revised 1934. Prepared by the Board of Engineers for Rivers and Harbors, War Department. Paper; 6x9 in.; pp. 317. Maps, tables, photographs. For sale by Superintendent of Documents, Washington, D. C. Price 80c.

THE PORTS OF THE TERRITORY OF HAWAII—Port Series No. 17, Revised 1935—Prepared by the Board of Engineers for Rivers and Harbors, War Department. Paper; 6x9 in.; pp. 132. Maps, tables, photographs. For sale by Superintendent of Documents, Washington, D. C. Price 35c.

PUBLICATIONS OF THE INTERNATIONAL ASSOCIATION FOR BRIDGE AND STRUCTURAL ENGINEERING—Vol. III, 1935. Paper; 6½x9½; pp. 438; charts, photographs, tables. Published by the General Secretariat in Zurich. For sale at Ag. Gebr. Leemann & Co., Zurich 2, Stockerstrasse 64. Price 30 francs.

RECREATION SURVEY, SAINT PAUL, MINNESOTA—By Katherine B. Spear, initiated and conducted under the supervision of the St. Paul City Planning Board, George H. Herrold, Managing Director and Engineer. Paper; 8½x11 in.; pp. 214; numerous tables and charts. Published in mimeograph form and available in a limited number from the St. Paul City Planning Board, St. Paul, Minn. Postage required; weight 3 lb. *. . . A report on an elaborate ERA research concerning the recreational facilities and organization in St. Paul which brings out the connection between juvenile delinquency and provisions for recreation; such as parks and playgrounds. Increase of recreational facilities in the city and the establishment of a centralized municipal organization to care for recreational needs is suggested.*

THE ST. LAWRENCE DEEP WATERWAY—A CANADIAN APPRAISAL—By C. P. Wright. Cloth; 5½x8½; pp. 450; tables, maps. Published by The Macmillan Company of Canada, Toronto, Ont. Price not given.

SCIENCE ADVISORY BOARD, Second Report, Sept. 1, 1934 to Aug. 31, 1935—Paper; 7x10 in.; pp. 494. Presumably can be obtained from the Superintendent of Documents, Washington, D. C. Price not given.

STANDARD PRACTICES (For Diesel Engines)—Cloth; 6x9 in.; pp. 162. Diagrams and tables. Published for the Diesel Engine Manufacturers' Association by Diesel Publications, Inc., 192 Lexington Ave., New York.

STEADYFLOW TRAFFIC SYSTEM—Vol. IX, Harvard City Planning Studies. By Fritz Malcher. Cloth; 7x10 in.; pp. 91. Published by Harvard University Press, Cambridge, Mass. $1.

STRENGTH AND RELATED PROPERTIES OF WOODS GROWN IN THE UNITED STATES—Technical Bulletin No. 479, September, 1935; by L. J. Markwardt and T. R. C. Wilson. Paper; 6x9 in.; pp. 99; diagrams and tables. Published by United States Department of Agriculture. For sale by Superintendent of Documents, Washington, D. C. Price 25c.

THE WORK OF THE SANITARY ENGINEER—By Arthur J. Martin. Cloth; 5½x8½ in.; pp. 488; tables, diagrams, photographs. Published by Macdonald & Evans, London. Price 16s. net.

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January 30, 1936

Elwood Mead, Engineer

ELWOOD MEAD, great engineer and farsighted administrator, is dead after giving a lifetime of unflagging devotion, supported by rare genius and knowledge, to the task of reclaiming the world's arid wastes for human habitation. What he accomplished is typified by his earliest work and his last—his labors in Wyoming fifty years ago, when he was scarcely out of his apprentice period, and his twelve years of direction of the Bureau of Reclamation from the turbulent days of 1924 until last week. When he was called to Wyoming as territorial engineer, at the time it was about to advance to statehood, the heavy responsibility of writing the principles of water administration into the constitution and the statutes was entrusted to him; how he carried out that task made a lasting contribution to Wyoming's future and to sound government everywhere. The closing period of his life was shaped by the controversies that surrounded federal reclamation in 1923, when Arthur P. Davis was made the victim of political intrigue. Mead, after participating in the Factfinders' inquiry of 1924, was called upon to head the reorganized Reclamation Service. In the face of every discouragement he carried the reclamation communities forward to prosperity and created a new era of reclamation. And even before this task was well in hand the unprecedented problem of carrying out the great Boulder Dam project claimed his attention. In guiding the authorizing legislation, in working out the power contracts that made it possible, in directing the engineering plan and the execution of the vast enterprise, Elwood Mead wrought for himself a monument that will endure. All his work expressed the directness, practical sense and sincerity of the true engineer.

Initiative and Progress

FIVE YEARS of continuous effort to perfect the armament of the roadbuilder were represented in the remarkable Cleveland Road Show. In its physical aspect, and also in the spirit of optimism and faith in the future displayed by all, the show proved that the years since the last exhibition of the kind were well spent in development, and that the initiative of the equipment and materials industries serving the road field was not dulled by the depression. Every part of the field gave evidence of significant progress—an advance through orderly development rather than through revolution. A new level of efficiency in roadbuilding performance is definitely presaged. Characteristic trends are toward fast, fully powered earthmoving units; more specialized tools for individual operations; greatly perfected mechanical design not only in the shaping of structure and parts but also in weight efficiency and distribution, in approach to machine tool standards, in the use of welded members, in centralization of control. Finally there is the impressive fact that virtually every type of roadbuilding machine is now being mounted on rubber tires, even the largest dump trucks and small shovels being shown with tires. The thorough engineering design that was the outstanding feature of the show is evidence of competent builders ready to keep pace with every demand.

Thrice Notable

THE NEW LIFT BRIDGE over the Cape Cod Canal at Buzzards Bay, Mass., sets a new record for length with its span of 544 ft., makes use of synchronous motor drive and is the first movable bridge to operate on anti-friction counterweight bearings. It thus is thrice notable and might even be termed four times notable, since in some of the early studies of its design serious consideration was given to building it of structural aluminum. Its roller-bearing counterweight sheaves are, however, its chief claim to fame, for they represent distinct departure from past practice. By reducing bearing friction, which is the chief resistance to be overcome in movable bridges, since the counterweights take care of all but about one-half of one per cent of the span load, power requirements were reduced 50 per cent. As with all new improvements, however, there are corollary disadvantages, the full dollar value of this power savings being offset by extra investment in brakes, to control the smoothly operating sheaves. The net gain, nevertheless, was substantial enough to warrant the adoption of the roller bearings, suggesting that future lift-bridge designs should not be made without an investigation of the advantages of similar installations.

The Worm Turns

FEW STATE LEGISLATURES, fortunately for highway interests, are to meet this winter, but in the nine bodies that will be in session changes will be attempted in gasoline tax legislation. In most states the announced movement will be toward tax reduction, but in others it is directed to diversion for relief. Here again New Jersey is a leader in making victims of road users for the sacred purpose of relieving communities of their "poor lists." The cheering fact is that there are signs of revolt (the indicated movement for gasoline-tax reduction is one of them), as for example the proposal in West Virginia for a city gas tax and in Arkansas for a gas tax to raise fund for an Arkansas Centennial Celebration, which aroused such a furor of protest that the tentative seekers of easy money from motorists beat a hasty retreat. It is in doubt, of course, whether the present rebellion is inspired by indignation at the misuse of road tax money or by the natural opposition to more taxes, but the action is toward a good purpose. It may give courage to Congress to complete the work begun in the last federal-aid authorization act and hold back all federal road money—not merely a fraction—from states that divert their road taxes to other uses. But if, according to the federal budget announced, there is to be no federal-aid appropriation for 1937, the withholding of federal money as a penalty for diversion of state road funds means nothing, and again the fight to protect road funds devolves solely on the road user.

At Least Premature

THE PROPOSAL of Senator Norris to extend the limited experience of the Tennessee Valley regional development plan into the tremendous dimensions of the entire Mississippi Valley is a venture into unknown possibilities

that should promptly be shelved. To say the least, it is premature. The physical resources of the region from the Alleghenies to the Rockies are still largely unknown in their aggregate, but in any event they are vast in size as well as in their impact on scores of millions of people. It would be beyond reason, and utterly alien to all principles of American government, to undertake their planning and administration through a regional supergovernment until much more is known of them than at present. It may be that in due course the state, regional and national planning established within the last three years, and now slowly working out its methods, may show the way to better administration of our natural resources. It has not done so to date.

Faster Rail Service

FOUR TRUCKS and trailers arrived in New York a few days ago after a seven-day run from Los Angeles. They brought 72,000 lb. of freight and were accompanied by passenger cars in which the thirteen drivers rode or slept while not at the wheel of a truck. These trucks are said to be forerunners of a regular transcontinental service that is expected to start in the spring. Their coming cannot but cause speculation as to the extent to which motor trucks can take from the railroads the long-distance handling of high-grade freight in much the same manner that they have taken the cream of the short-haul business.

Considering the number of men, trucks and passenger cars required to transport 72,000 lb. of freight—about the capacity of two ordinary box cars—across the continent it does not appear that such a service can be a serious threat to the railroads, provided they will modify their practices to meet the challenge. One locomotive and a crew of four or five men can handle 100 box cars over all but the mountainous divisions of the transcontinental rail lines. In the long haul, therefore, the railroads have a marked advantage over trucks in labor and fuel costs per ton handled. The advantage will increase as the Motor Transport Act and the unionization of truck operators begin to take effect. But time in transit also is an important factor in freight handling, and here the trucking companies now have an advantage, chiefly because they are not hampered by full-tonnage train rules that require an endless amount of switching to fill out or reduce the tonnage of a train at division points.

The railroads, if they will, can remove many of their disadvantages, as is indicated by what already has been done, such as the overnight service from New York to New England points. But eradication will call for scrapping many traditional practices, just as radical changes have been made in terminal and short-haul practices by a few of the more progressive railroads to meet truck competition for the short-haul business. And essentially the two types of business are intimately related. What the shipper wants above all is convenience in getting his shipment delivered at a reasonable cost. The trucking companies made their initial inroads into the railroads' short-haul business by offering door-to-door delivery, thus eliminating the delays and bother of delivering the shipment to the railroad freight house and of picking it up at the other end. The railroads now are aware of their handicap in this respect and are rapidly moving toward universal acceptance of door-to-door delivery. If they will move more quickly toward adoption of methods that will speed up their long-haul movements, they have little to fear from trucks in that field. Some of the necessary changes are operating ones, but others call for an unusual amount of engineering skill backed by a knowledge of operating problems. Thus there is opened up an inviting field of study for railroad engineers.

For Coordination of Effort

WE LIVE in an age that is creating a new transportation system, the modern road network, whose ultimate influence promises to be fully as revolutionary as was the building of canals and the later construction of a great railroad system, a century ago. As yet the full magnitude of what is being done cannot be gaged with precision, but we realize even now that the difficulties and obligations of the undertaking are exceptionally great.

Such a cosmopolitan gathering as last week's convention of roadbuilders at Cleveland gives visible proof of the wide interest that surrounds highway construction and the complexity of its technical aspects. At the same time it brings to mind the fact that the development of our new transportation agency involves more than construction. Other factors are of coordinate importance: system planning, transportation economics, correlation of road service with other community services and functions, and, not least, structural and operating design.

In practise moreover these factors are rarely distinct and separate. To a large extent they are the concern of the same men, and even though the discussions of research, of structural design, of planning or of construction are often conducted by separate groups the segregation is one of ideas rather than of minds and men. If, then, the several groups of road interests that now carry on separate meetings could be brought into closer contact it is certain that the power of road study and the momentum of progress would be distinctly increased.

At present the various groups meet at widely different places and times, and their contact through interchange of members is quite limited. The Highway Research Board met in Washington six weeks ago; the State Highway Officials soon afterward in Florida; and now, more than a month later, the Road Builders with their city and county official affiliates in Cleveland. These three essentially different groups are uncoordinated as to program, objectives and subjects of discussion, and are but imperfectly linked by the participation of a few individuals in all of the meetings. Efficient attainment of purpose is hampered by such segregation.

This state of affairs can be bettered, and it should not be difficult to do so. Without doing violence to the necessary independence of the several organizations, it should be possible to plan their meetings so that they would be held in the same city or in adjacent cities during immediately contiguous periods of time. We are confident that were this done it would bring a large gain in accomplishment to each of the groups. Even more than this: Through the mutual inspiration of parallel effort it would raise up a higher and clearer ideal of the service to be rendered.

It needs only a convincing realization of the obligations and problems before the highway engineering art, and a determination to establish such coordination, in order to clear the way for its attainment. The result, we know, would be equally beneficial to the art itself and to the community at large.

CURRENT NEWS

Silicosis Testimony In Washington

Much-quoted local doctor informs House subcommittee Hawks Nest tunnel charges are grossly exaggerated

THE hearings called by a subcommittee of the House Labor Committee, prompted by Rep. Marcantonio's introduction of a resolution to investigate charges of alleged silicosis deaths in connection with the driving of the Hawk's Nest power tunnel, have been continued with testimony running along the same vein as reported in these pages for the past two weeks. One of the sensational developments of the past few days is the refusal of Dr. L. R. Harless, country doctor of Gauley Bridge, W. Va., to appear before the committee. Dr. Harless has been freely quoted by witnesses in presenting sensational testimony regarding working conditions within the tunnel and alleging wholesale silicosis deaths. He not only refused to appear, but wrote the committee that the silicosis situation in Gauley Bridge "has been grossly exaggerated by statements in newspapers and by rumors here."

As one of three doctors who examined workers seeking silicosis damages from the contractor, Dr. Harless stated in his letter that out of 309 workers examined, thirteen died of silicosis, and 137 were found to have some lung trouble caused by dust in the tunnel. Of this 137, the letter continued, many showed co-existing tuberculosis. The letter stated further that there had been very little, if any, impairment of health of those found to have silicosis and that there were only a few cases "moderately affected" left in the community. He also stated that while many of the silicosis suits were meritorious, "a number were nothing more than a racket."

Rep. Marcantonio is now seeking power of subpœna for the committee and is asking for an appropriation of $5,000 for expenses to continue the hearings. The request for subpœna power is directed toward forcing Dr. Harless to appear as a witness.

Following testimony offered by James Mason, an attorney who represented workers in the silicosis suits filed against the contractor, charges of "wholesale murder" and "outrageous racketeering" were levelled at Rinehart & Dennis, the contractor, by Rep. Marcantonio and Rep. Dunn, members of the committee holding the hearings. Mason gave hearsay evidence to the effect that employees of the contractor had tampered with the juries in the two court trials in which suits were heard, and that the contractor undertook the tunnel job without precautions, although it was "fully informed of the possibility of workers developing silicosis." He further testified that two attorneys who accepted an out-of-court settlement for their clients were later given a check for $20,000 by an official of Rinehart & Dennis. "The suspicious tampering with the jury and payment of that money was the most damnable outrage ever perpetrated in any state," the witness continued.

Expert testimony in the case was presented to the subcommittee by Jas. W. Finch, director, U. S. Bureau of Mines, who patiently explained the pathology and other facts of silicosis as determined by the bureau's findings. Mr. Finch pointed out that the pathological response to dust exposure is very slow and several year's exposure are required to produce disablement.

Explaining that silicosis is one of the most widespread and important industrial diseases, Mr. Finch said it is likely to be prevalent in any mines where wet drilling is not pursued. He said further that some industries in existence for over 10 years are just now having silicosis brought to their attention.

"In addition to a wide recognition of the disease and an increasing number of legitimate claims for injury, racketeering in compensation has arisen to an alarming degree," Mr. Finch declared. "This aspect is rapidly creating difficulties in the enactment and administration of laws that provide compensation for this disease. With the rapidly increasing claims, both legitimate and illegitimate, it is difficult to estimate insurance rates and insurance companies are reluctant to accept the risks."

Questioned by the subcommittee, Mr. Finch, through his staff, revealed that rock dust respirators were not approved by the Bureau of Mines before 1934. It was developed, however, that there were respirators (unapproved) on the market prior to 1932, when the Gauley Bridge tunnel was being constructed.

Nebraska Hydroelectric Funds Delayed by Temporary Order

A temporary order restraining allocation of $24,800,000 by PWA for construction of the Platte Valley, Tri-County and Columbus hydro-electric projects in Nebraska was signed Jan. 27 by Justice Adkins, of the Supreme Court of the District of Columbia. The order directed Administrator Ickes to show cause Feb. 5 why a permanent injunction should not be granted.

Engineers of Oklahoma Join New National Society

The Oklahoma Society of Professional Engineers, at its first annual convention held at Oklahoma City Jan. 25, voted to join the National Society of Professional Engineers. This brings the number of member state societies in the national society up to ten, and the total number of individaul members up to 4,356. The other state societies in the national society are New York, Ohio, New Jersey, Pennsylvania, Connecticut, Illinois, Kentucky, West Virginia, and District of Columbia.

Mississippi River Flood Control

Provision for diversion of 1,000,000 sec.-ft. held by General Markham as necessary for adequate flood safety

TO MAKE the lower Mississippi Valley safe from floods it is imperative that provision be made for the diversion of 1,000,000 sec.-ft. of water, Major General Edward M. Markham, chief of engineers, told a subcommittee of the Senate Commerce Committee on Jan. 27. At the same time he proposed that flowage payments be made on the basis of twice the assessed value of the property and suggested condemnation of 25 per cent of the land needed if contracts could be secured for the remaining 75 per cent. The committee before which General Markham appeared is considering the Overton bill, which would prescribe the method of compensation for land used in Mississippi River flood control work.

General Markham said he did not believe in the government's buying the land outright and returning it to forests. He pointed out that the Morganza floodway, situated near the Red River backwater, is an excellent piece of conservation work and that it would make it possible to limit the discharge of flood water to the west side of the Atchafalaya.

Reservoirs costly

Provision should be made, General Markham told the committee, to divert 1,000,000 sec-ft. To hold that amount back by reservoirs would cost $1,500,000,000, and he emphasized that the reservoirs could be used for no other purpose than for holding back flood waters. General Markham was convinced that there is no other way for dealing with possible floods except by diversion.

General Markham submitted a report signed by the Secretary of War, in which it was stated that the enactment of the bill in its present form is unwise, as it would mean accepting immeasurable responsibilities, and that the department is opposed to the assumption of the entire cost of protecting backwater areas in the White River basin. In insisting upon some yardstick for value, General Markham said that this is prompted by experience in the past in efforts to get property at reasonable prices through condemnation proceedings.

Progress encouraging

In answer to questions propounded by Senator Overton, General Markham said that the program has reached the point where the river between Cape Girardeau and the Arkansas River will carry a superflood between the levees. He expressed the opinion that the south bank of the Arkansas had been leveed strongly and would hold a superflood and that the chance of crevasse is remote.

General Markham also pointed out that water gradually is being taken down the Atchafalaya and that the situation is very

encouraging. It is planned to open the Eudora floodway when water reaches 55 ft. on the Arkansas City gage and 51 ft. on the Vicksburg gage so as to allow the river to carry no more than 1,400,000 sec.-ft. In answer to another question General Markham said that if the maximum is paid all property owners in the Eudora floodway, that the total payment will be $16,709,000. When asked if it would be possible to go ahead with the recommendations for the Atchafalaya basin, leaving the middle section of the river in abeyance while efforts are made to straighten out the existing controversy, General Markham stated that this would be undesirable as it would leave the middle section in danger of a crevasse.

General Harley B. Ferguson, president of the Mississippi River Commission, said that it would take two more years to determine the effect of the cut-offs between the Arkansas and Red Rivers. He said the cut-offs are of great value but should be relied upon to increase the intervals between the times it would be necessary to use the Eudora floodway. The effect of the cut-offs is to reduce flood heights all the way down the river and the cut-offs are considered as an aid and not as a substitute for diversion.

Fair compensation advocated

Senator Joseph E. Robinson, of Arkansas, defended compensation for lands needed for flood control purposes on a just compensation basis and at the same time indicated that he was convinced that without diversion the lower valley cannot be protected from all floods. He declared that the just compensation basis is the only equitable way for the government to acquire property. Senator Overton followed Senator Robinson and urged continuation of the compensation procedure outlined in the 1928 act. He took issue with the engineers in suggesting that the levee boards acquire the property and the United States reimburse them to the extent of double the assessed value of the property used, expressing the opinion that it is unconstitutional to impose a limitation on flowage damage.

Work To Be Resumed on Pend Orielle Project

After almost five years of inactivity, work on the Pend Oreille River hydro-electric project in British Columbia has been resumed on the proposed damsite. Preliminary work will be carried out this year by the West Kootenay Power & Light Co., Rossville, B. C., according to announcement by the provincial government.

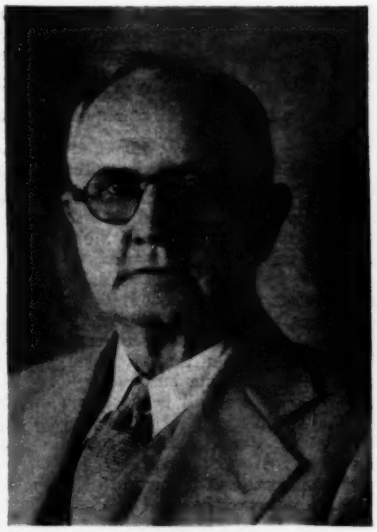
Licenses giving entire rights for the development of the Pend Oreille River to the West Kootenay Power & Light Co. were issued by the provincial water comptroller in 1930 (*ENR*, Aug. 28, 1930, p. 343). The licenses covered a development of two dams, one at Seven Mile Creek and the other at Cedar Creek. These would harness the flow of the Columbia River to the United States boundary and would develop 175,000 continuous horsepower.

The program for this year calls for the removal of the overburden on the damsite which was chosen for the development and which is located a short distance from the junction of the Pend Oreille River with the Columbia. The power company had previously conducted extensive borings to discover a suitable site for the dam.

Elwood Mead Dies At 78

ELWOOD MEAD, Commissioner of Reclamation since 1924, world-famous irrigation authority, died at his home in Washington on Jan. 26 after a short illness, at the age of 78. His death closed a distinguished career of public service. The last two years were perhaps the most active of an unusually busy life because of the heavy demands made on him by the large and extensive emergency construction programs under the 1933 and 1935 Emergency Relief Acts.

Only a few weeks before his death he was on the ground planning the schedule of operations of the great Central Valley project in California. Just before this his career had reached its fulfilment with the completion of Boulder Dam, dedicated just four months ago. Though this colossal project had been conceived and partly worked out by his predecessor, Arthur P. Davis, the responsibility for its final planning and execution fell on Dr. Mead and absorbed a large part of his energies during the latter part of his administration.



Elwood Mead

The best remembered and perhaps most important part of Dr. Mead's career was that spent from 1924 to 1936 as head of the U. S. Bureau of Reclamation. When Arthur P. Davis, who in 1914 succeeded the first Director of the Reclamation Service, Frederick H. Newell, was summarily dismissed in 1923 by Hubert Work, new Secretary of the Interior, country-wide protest led to the appointment of a fact-finding board, of which Dr. Mead, then at the University of California, was invited to be a member. The exhaustive report of that board, largely written by Dr. Mead, initiated far-reaching modernization of reclamation practice and legislation. Immediately after its completion Dr. Mead was chosen to head the Bureau.

In an administration marked by fairness and wisdom joined to firmness he rehabilitated the service, fundamentally improved reclamation practice and gained the enthusiastic support of all interests, even of the farmer groups that in the early days of his administration hanged him in effigy. He eliminated the destructive land speculation that had marked reclamation in earlier years and established the practice of selecting settlers by capital and experience qualifications. Even before these reforms were completed the task of initiating and carrying out the Boulder Dam project and the associated All-American Canal fell to his lot. Long before Boulder Dam was completed the need for emergency programs arose, and at the age of 75 he assumed this new burden of initiating reclamation works amounting to nearly $200,000,000 in cost.

Elwood Mead, born at Patriot, Ind., Jan. 16, 1868, received his education at Purdue University, and after service on Wabash River surveys he became professor of irrigation at the Colorado State College of Agriculture in 1884, occupying the first chair of the kind to be established at an American school. He also served for a year as assistant state engineer. In 1888 he was called to Wyoming as territorial engineer, just when statehood was in preparation. One of his first assignments was to write the provisions of water law to be included in the constitution and statutes of the state. In carrying out this task he created a wholly new body of water law, one which discarded both the riparian and the use-appropriation principles. Under the Mead code the status of water was made similar to that of minerals and land; the state retained title to all water and diversions.

After eleven years spent in Wyoming, Mead went into federal service as chief of the Irrigation and Drainage Division of the Department of Agriculture, concurrently serving as professor of irrigation at the University of California. In 1907 he was called to Australia as irrigation adviser and was made chairman of the State Rivers and Water Supply Commission of Victoria. During eight years of service there he inaugurated a comprehensive water conservation and reclamation plan that is one of the model institutions of the British empire today. He said of that experience: "Victorian laws carry into effect the principles for which I have been contending for twenty years; the state has not only reserved to itself the perpetual ownership of the water of all streams, but has retained title to bed and banks as well."

On returning to the United States in 1915 Dr. Mead resumed his teaching at the University of California, and also served as chairman of the State Land Settlement Board. In the latter capacity he was responsible for the creation of the two widely known state land settlements at Durham and Delhi. He left the University in 1924 to accept President Coolidge's appointment to the position of Commissioner of Reclamation.

Dr. Mead was honored by the University of Michigan in 1925 and the University of Wyoming in 1934 with the honorary degree of Doctor. He was a member and past Director of the American Society of Civil Engineers. He served on numerous governmental committees, and among his recent appointments in this direction was the Water Resources Committee of the Interior Department. Many foreign governments consulted him, among them Palestine, Cuba, Haiti, New South Wales, Canada, Hawaii, Java and Mexico. He was the author of two books widely used as texts, "Helping Men Own Farms" and "Irrigation Institutions."

Wagner Labor Act Upheld in Suit

Federal court declares Wagner Act consistent with Congress' policy and denies injunction in Memphis, Tenn., court case

ONE month after having been vigorously scored as unconstitutional by a federal district judge, the Wagner labor relations act was upheld as consistent with the policies of Congress by Federal Judge Martin in a ruling given in Memphis, Tenn., on Jan. 23. An injunction, sought by the Bemis Brothers Bag Co., Bemis, Tenn., to prevent examination of records and labor contracts by the National Labor Relations Board of the Tenth Region, was denied by the court.

The suit for injunction resulted from complaints filed by Local No. 1,838, United Textile Workers of America, alleging that the employers had violated the rights of collective bargaining by its employees as provided for in the labor relations law. In denying the injunction Judge Martin declared that "it would be utterly inconsistent . . . to invade the powers of the legislative and executive departments of the national government by staying the proceedings of an executive board established by an act of Congress, except upon a conclusion reached by the court that such act is unconstitutional beyond the shadow of a doubt."

In answering the charge by the plaintiff that the act denies the employers the right of a jury trial at the hearing before the Labor Relations Board, the judge pointed out that the board's decision is subject to review by a federal court.

Legislation Necessary to Aid PWA Slum Clearance

An advisory opinion by Comptroller General McCarl concerning rentals on PWA low-rent housing projects makes it mandatory that new legisation be enacted to permit the administration of the slum clearance program, according to Administrator Ickes, who announced on Jan. 27 that such necessary legislation will be placed before the present Congress.

The Comptroller General had ruled that, in the absence of further legislation, no PWA grant could be applied to slum clearance projects financed from NIRA funds and that rentals would have to return the full cost of the project. Ten of the 48 projects on the PWA slum clearing program are affected by the ruling, the balance being financed under the emergency relief appropriation of 1935.

"His opinion holding that there is nothing in the National Industrial Recovery Act which contemplates the allowance of a 45 per cent capital grant, as to other PWA projects, is clear testimony," said Administrator Ickes, "that if this program is to be administered successfully for the benefit of those for whom it was intended, there must be additional legislation. The Public Works Administration, without subsidy, is able to build housing which can be made available to persons of limited incomes, but not to the lower income groups which we are seeking to house. It is the lower group which must be taken care of."

American Concrete Institute Annual Convention Program

Subjects of practical interest, dealing, for the most part, with methods, tools, on-the-job conditions, economies and improvements, will feature the papers and discussions at the 32d annual convention of the American Concrete Institute to be held in Chicago Feb. 25-27. Election of officers for the coming year will be held by the Institute during the convention period. The meeting will get under way on Tuesday afternoon, Feb. 25, with a durability, maintenance and repair session. Among the papers presented at this session will be one on the durability of concrete by Prof. C. H. Scholer, head of the department of applied mechanics, Kansas State College. E. R. Dawley, professor of engineering materials, Kansas State College, will give a paper on the effect of alternate heating and cooling of concrete and G. E. Loughland, hydraulic engineer, Northern States Power Co., will discuss maintenance and repair of concrete structures.

New building code report

At the building regulations and building economics session to be held the first evening, a study of the economics of high strength concrete in building construction will be presented by F. E. Richart, research professor of engineering materials, University of Illinois, and a committee report on building regulations for reinforced concrete will be presented. On the afternoon of the second day, Institute business will be discussed and there will be a session on the making and placing of concrete, which will include papers concerning concreting at Norris Dam and Grand Coulee Dam, as well as a discussion of concrete by pump and pipeline, presented by Charles F. Ball, chief engineer, construction equipment division, Chain Belt Co. The underwater placement of concrete as handled on the San Francisco-Oakland Bay bridge will be discussed by Stanley M. Hands, associate physical testing engineer, California Division of Highways. Factors of the workability of concrete will be discussed by Winslow H. Herschel and Edward A. Pisapia, National Bureau of Standards.

On the last morning a concrete products session will be held, and among the papers presented will be one concerning rain resistance of walls of masonry units by R. E. Copeland, development department, Portland Cement Association. At the final session, on Thursday afternoon, economics of ready mix versus job mix concrete will be analyzed by a committee report, as will be recommendations for placing concrete by means of vibration.

Contract Let for Welding 45-Mile Pipe Line

A contract for the welding of a 45-mile 8-in. oil pipe line from Lake Charles to Basile, La., has been let to the Apex Construction Co., Houston, Texas, by the Continental Oil Co., Ponca City, Okla. Specifications call for the use of the Lincoln-weld method of oxyacetylene welding. The 8-in. line is to be laid in the same ditch in which a 6-in. line is being constructed. Work on the 6-in. line began Dec. 2 and work on the 8-in. line is to begin this month.

New York State Sewage Association

New York State Sewage Works Association at eighth annual meeting in New York City discusses treatment of wastes and

THE EIGHTH annual meeting of the New York State Sewage Works Association was held in New York City, Jan. 14-17, with over 200 members and guests attending. At a joint dinner with the Sanitary Engineering Division of the American Society of Civil Engineers, Abel Wolman, chairman of the Water Resources Committee, National Resources Committee, spoke on problems of water pollution.

At the general business meeting an amendment to the constitution was passed permitting the organization of local sections, and an application for the formation of the Long Island Section was approved. At the technical session, Earl Devendorf, associate director, Division of Sanitation, New York State Department of Health, presented a paper on policies and progress in sewage treatment in New York State, giving particular reference to progress made in construction under federal and state relief agencies. This was followed by a paper on progress in milk waste disposal presented by Dr. C. R. Roberts, Sheffield Farms, Inc.

The Kenneth Allen Memorial Awards for 1935 were presented by President Morris M. Cohn to Samuel I. Zack for the most meritorious paper of a technical and research nature, and to Harry H. Hendon of Birmingham, Ala., for the best paper on sewage plant operation. Walter D. Binger, deputy commissioner of the New York City Department of Sanitation, presented a talk on the progress in sewage treatment in New York City during 1935. A paper on chemical treatment during 1935 at Birmingham, Ala., was presented by Harry H. Hendon, and Samuel I. Zack gave a paper on operating experiences at Perth Amboy, N. J. Discussion following these papers indicated renewed interest in chemical treatment of sewage. Dr. A. J. Fischer presented a paper on the economics of various methods of sewage sludge disposal and John V. Fenton briefly described the Great Neck, L. I., sewage project. Another joint technical session was held with the Sanitary Engineering Division of the American Society of Civil Engineers and on the last day an inspection trip was made to the Great Neck plant.

Officers elected were as follows: Linn H. Enslow, New York City, president; Charles C. Agar, Albany, vice-president; A. S. Bedell, State Department of Health, Albany, was reappointed secretary-treasurer. Fred J. Biele, Huntington; Harry Eustance, Ithaca; Thomas J. Smith, Newark, N. Y., were elected to the executive committee for a period of three years.

A Correction

In the caption of the picture of the approach to the San Francisco-Oakland Bay Bridge on p. 106 of our issue of Jan. 16 it was stated that Rincon Hill is the highest point in San Francisco. It should have read highest point in San Francisco reached by the bridge. Rincon Hill is not the highest point in the city.

Hetch Hetchy Power Use Plan Submitted By San Francisco

San Francisco, on Jan. 28, proposed to Secretary Ickes a plan to comply with the Raker Act on the disposal of Hetch Hetchy power as follows: (1) City to buy from Pacific Gas & Eectric Co. distribution system covering half of city area and two-thirds of population; (2) Use of present Hetch Hetchy, Moccasin and Early Intake plants without change, also present transmission line to Newark substation of company; (3) Sale of all city-owned energy to the company at Newark as at present at 75 per cent load factor; (4) Repurchase of same power at 43 per cent load factor from company at substations in San Francisco for same sum involved in item 3 giving the company approximately 205,000,000 kilowatt hours annually of secondary power as compensation for transmission between Newark and San Francisco plus standby service plus use of transformers.

The city contends that the excess power must be wasted if not used as a means of payment, and the use of company lines will eliminate need for a $9,000,000 duplicate transmission line and steam standby station. The plan involves a city bond issue of $18,600,000 but no new construction except offices and warehouses. The city believes the plan provides reasonable compliance with the act. Mr. Ickes will study it before ruling on it, but meanwhile complimented the city officials on their sincere attempt to present a workable plan. The company has not committed itself but as the terms are approximately as at present it is expected to accept the plan if Mr. Ickes approves. Consumers in the area affected would get a ten per cent rate cut.

SOCIETY CALENDAR

ENGINEERING INSTITUTE OF CANADA, annual meeting, Hamilton, Ont., February 6-7.

AMERICAN CONCRETE INSTITUTE, annual meeting, Chicago, Ill., February 25-27.

AMERICAN RAILWAY ENGINEERING ASSOCIATION, annual meeting, Chicago, Ill., March 10-12.

AMERICAN SOCIETY FOR TESTING MATERIALS, annual meeting, Atlantic City, N. J., June 29 to July 3.

JOINT MEETING, METROPOLITAN SECTIONS, AMERICAN WELDING SOCIETY, AMERICAN SOCIETY OF CIVIL ENGINEERS, AMERICAN WATER WORKS ASSOCIATION, New York City, Feb. 4; Dr. Otis E. Hovey will speak on steel dams.

ASSOCIATION OF HIGHWAY OFFICIALS OF NORTH ATLANTIC STATES, annual meeting, Atlantic City, N. J., February 12-14.

MINNESOTA SURVEYORS AND ENGINEERS SOCIETY, Minneapolis, February 20-21.

MINNESOTA FEDERATION OF ARCHITECTURAL AND ENGINEERING SOCIETIES, Minneapolis, February 21-22.

SOUTHWEST ROAD SHOW AND SCHOOL, Wichita, Kan., February 25-28.

AMERICAN SOCIETY FOR TESTING MATERIALS, regional meeting, Pittsburgh, Pa., March 4, and meetings of committees, March 2-6.

ROCHESTER SECTION, AMERICAN SOCIETY OF CIVIL ENGINEERS, at its annual meeting elected the following officers: President, CHARLES F. STARR; vice-presidents, GEORGE C. WRIGHT and W. H. ROBERTS; secretary-treasurer, N. D. Davidson.

Public Works Program Advocated

Permanent, well-planned public works program held by Secretary Ickes as best means of combating depression; government considered to be the only agency that can stimulate business recovery

(Washington Correspondence)

PLANNED PUBLIC WORKS on a permanent national basis as a means of absorbing the unemployed during periods of industrial depression was advocated in a speech on Jan. 26 by Secretary Ickes. The potential field for such activity, he pointed out, is practically unlimited, and the benefits to be expected are manifold.

Answering critics who maintain that the efforts of the country in this direction have not been satisfactory, the Secretary stated: "I have no hesitation in saying that the public works theory has not failed here. It has never really been tried. We have dabbled with public works; we have done some wishful thinking about public works, but the principle has never been given a trial on a scale commensurate with our needs and adequate to the situation."

In support of this contention Secretary Ickes stated that, in so far as a real public works program is concerned, only $3,000,000,000 has been provided over a period of two and a half years, an average expenditure of $1,200,000,000 per year, as compared with an estimated deficiency in private construction volume of $8,000,000,000 per year. Although appropriations for public works were much greater than these figures, many deductions were made to support other relief activities such as CCC, TVA, naval construction and others which could not be classified as public works.

Advance preparation and the maintenance of a skeleton organization capable of rapid and orderly expansion in times of need are essential to full utilization of public works as a cushion, according to the Secretary. He warned against having to repeat the experience of 1933, when without a plan or organization, the administration was suddenly called upon to undertake a program of public works. Notwithstanding this handicap any fair-minded and impartial critic would say that the public works job of this administration has not only been well and honestly done but that, considering the circumstances, it has been expeditiously carried out, declared Mr. Ickes.

Of the first public works program practically all of the 15,000 federal projects have been completed, considerably more than half of the non-federal projects are now in use, and 95 per cent of the $200,000,000 railroad rehabilitation and equipment construction is finished. About $1,900,000,000 has been disbursed, resulting in an estimated 3,400,000 man-years of direct and indirect employment.

Only government can stimulate business

Accepting the theory that an economic depression is the stagnation of money in the circulatory system of commerce, Mr. Ickes reasoned that at such times the government alone has both the money and the will to stimulate business. There is no choice except for the people collectively to do what individuals cannot or will not do. The Secretary is convinced that the soundest, safest and most beneficial manner in which this can be done is through a nation-wide building program. He holds that a public works program has all the attributes required to stimulate business inasmuch as it puts money into circulation and creates permanent and valuable assets in return for the money expended. Such a program has a tonic effect upon the production of producers' goods; it gives men employment at worthwhile jobs and it increases federal revenues. In addition to providing work directly at the site, its benefits are widely diffused.

The Secretary stated, "I submit that there is nothing else that can be undertaken by the government that is so well calculated to put an end to a depression as is a carefully-planned and executed program of public works. But enough money must be spent to give a real stimulation."

Fields for the legitimate expenditure of public works funds include a wide range, of which the Secretary mentioned public water supply and sewerage systems, schools and hospitals, reforestation, elimination of stream pollution, reclamation, power production, grade crossing elimination and highway lighting. He also proposed three transcontinental super-highways "unmarred by billboards, hot dog stands or indiscriminately located service stations and three or four north-south highways, some of which could be continued into Alaska and Central America.

Obituary

CHARLES J. DUNN, 70, engineering contractor of Denver, Colo., and a member of the firm of Dunn and Gibson, died in Denver on Jan. 16.

WILFRED KEEFER BARNARD, civil engineer, died Jan. 22 at his home in Pasadena, Calif. He was 57 years of age. Mr. Barnard had lived in California since 1906. After being graduated as a civil engineer from Yale University he entered the engineering corps of the Pennsylvania R.R. and followed that service by others with the Los Angeles and Salt Lake R.R., now the Union Pacific, and the Pacific Electric Ry. About 1912 illness caused his retirement from railroad engineering and after a year or so he entered private practice.

WILMER WESLEY SALMON, president of the General Railway Signal Co., died in New York City, Jan. 23, at the age of 69. After being graduated from Dickinson College, Mr. Salmon got his first experience on railroad work as a member of the engineering staff of the Pennsylvania R.R. He later became assistant engineer for the Chicago and Northwestern R.R. In 1893 he went with the Hall Signal Co. as an engineer and later became vice-president. From 1901 to 1904 he was president of the Taylor Signal Co. and then went with the General Railway Signal Co. as its president.

S. R. ALEXANDER, 88, a former city engineer of Clarksville, Tenn., died Jan. 24. He had been city engineer for 26 years.

HOWARD NIXON ELMER, general agent, Siebe, Gorman & Co., Ltd., and first president of the incorporated Chicago Engineers Club, died in Chicago, Ill., on Jan. 13, at

the age of 71. Mr. Elmer was graduated from Rensselaer Polytechnic Institute in 1877 with a civil engineering degree. After spending a number of years in civil engineering practice he became general agent for Siebe, Gorman & Co., in 1892. During the years 1906 and 1907 Mr. Elmer devoted a great deal of time to organizing the Chicago Engineers Club, of which he later became president. In January, 1932, he was made an honorary member of the Chicago Engineers Club.

JAMES V. R. BIBBINS, engineer in charge of traffic signal and transit surveys, Washington, D. C., died at his home there on Jan. 27, at the age of 58. Previous to his consulting work in this field, he had been manager of the transportation department, U. S. Chamber of Commerce. Mr. Bibbins was graduated from the University of Michigan and shortly after became commercial engineer for manufacturing and power development in the Westinghouse companies. He held this position for seven years and in 1909 became associated with the Public Service Commission, New York City, as assistant to Bion J. Arnold, consulting engineer and director of appraisals. Mr. Bibbins was engaged in consulting practice on transportation and its related economic and civic problems, including traffic surveys in some 20 cities in the United States and Canada. Some results of his work are a complete origin-destination survey of all rail traffic and movements in New Orleans, a similar survey in Rochester for rerouting transit lines, a district terminal survey in Chicago for the Union Station franchise proceedings, location of tunnels and transit extensions in San Francisco, a new industrial city and transportation service for Flint, Mich., and for other cities.

ELMER RICHARDS, president of Richards & Gaston, Inc., contractors of Newark, N. J., died at Balboa, Panama, on Jan. 23. Mr. Richards, who lived in Somerville, N. J., was 70 years old at the time of his death.

CONSTRUCTION STATISTICS FOR THE WEEK

FOR the fifth week of January engineering construction awards are $49,020,000. This brings the total for the year to date up to $288,547,000, almost double last year's January volume. This week, with $14,008,000 in private construction, continues last week's renewed activity in the private field. Public awards are $35,012,000, an increase over last week. This total is made up of federal awards, $4,017,000 and state and municipal awards, $30,995,000. Corresponding values for a year ago are: total, $24,922,000; private, $9,111,000; public, $15,811,000; federal, $3,219,000; state and municipal, $12,592,000.

Increased totals are recorded in sewerage at $7,579,000; bridges at $4,000,000; and public buildings at $14,663,000. Other classes were below last week: waterworks, $674,000; industrial buildings, $3,927,000; commercial buildings, $3,304,000; earthwork, irrigation, $818,000; streets and roads, $6,514,000.

The large contracts for the week include: assembly plant for General Motors, Southgate, Calif., $2,500,000; store building for S. H. Kress, Atlanta, Ga., $600,000; 3 schools, Pittsburgh, Pa., $1,077,000; medical and dental laboratories, University of Illinois, Urbana, Ill., $1,336,000; city-county courthouse for Davidson County, Nashville, Tenn., $1,775,000; highway awards by Louisiana, $534,000; by Michigan, $530,000; by Texas, $924,000; bridge awards by California, $1,092,000; by Michigan, $1,190,000; sewage disposal plant, Austin, Tex., $381,000; Contracts 3, 5, 6, Upper Des Plaines, Intercepting Sewer, Chicago, Ill., $2,081,000; Contract 12, Bronx Intercepting Sewers, New York City, $1,452,000; Contract 1, superstructure Wards Island sewage treatment plant, New York City, $1,220,000; earthwork, canal lining and structures, Ogden-Brigham canal, Bureau of Reclamation, Utah, $425,000; roadbed improvements, purchasing and laying 60 mi. 110 lb. rails during 1936, Denver and Rio Grande Western R.R., Utah and Colorado, $6,000,000.

Sales of state and municipal bonds for new construction total $5,590,000 for the week, and PWA loans and grants, $707,000. PWA loans to private companies total $825,000, the first recorded this year while corporate security issues are $4,592,000 for the week. Federal PWA allotments at $3,741,000 bring the total new capital for the week up to $15,455,000.

CONTRACTS

(Thousands of Dollars)

	Weekly Average Jan. 1935	Prev. 4 Weeks	Week Jan. 30 1936
Federal Government	$3,979	$12,042	$4,017
State and municipal	15,399	40,570	30,995
Total public	$19,378	$52,612	$35,012
Total private	5,977	7,270	14,008
Week's total	$25,355	$59,882	$49,020
Cumulative to date:			
1935...$148,264,000	1936...$288,547,000		

NEW PRODUCTIVE CAPITAL

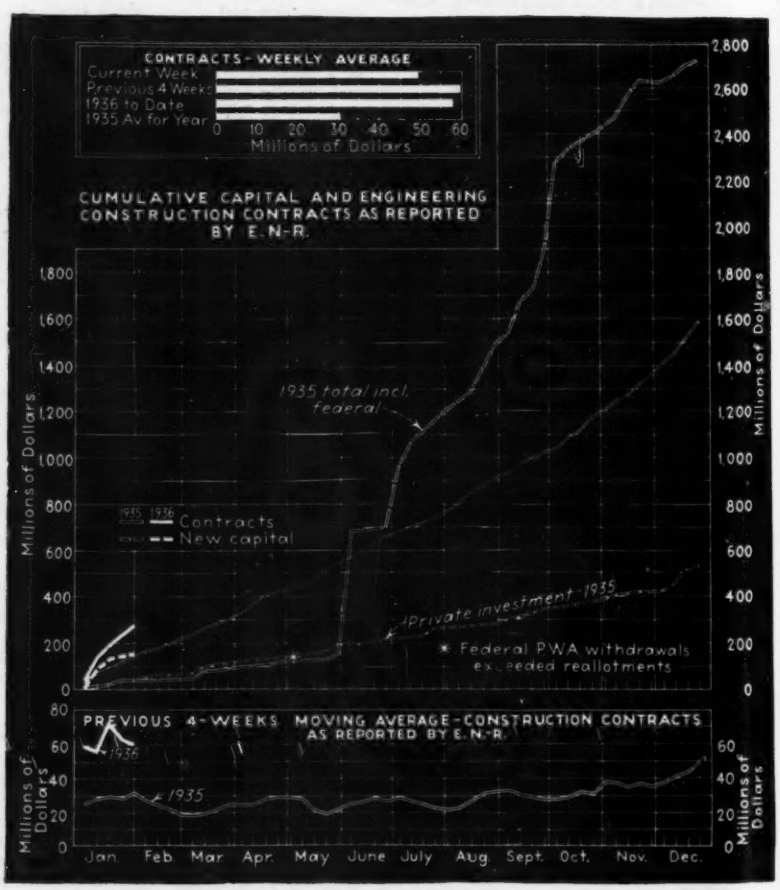
(Thousands of Dollars)

1936	Week Jan. 30	Cumulative
State and municipal	$5,590	$49,738
PWA non-federal	707	65,753
RFC loans	.....	25,000
Corporate issues	4,592	16,985
PWA loans	825	825
Total Non-Federal	$11,714	$158,301
Federal	3,741	3,805
Total new capital	$15,455	$162,106
Cumulative to date:		
1935...$31,250,000	1936...$162,106,000	

Note: These figures include private bonds, and stocks sold for productive purposes; state and municipal bonds for construction; PWA loans and grants to states and municipalities, including the special highway funds; PWA private loans, and allotments for federal construction, deficiency act funds. An arbitrary percentage (25%) of the WPA allotments and local contributions to WPA work is included to allow for the capital additions through the Works Progress Administration division of the new program.

INDEX NUMBER

ENR Cost	1913 = 100	1926 = 100	ENR Volume	1913 = 100	1926 = 100
Jan., 1936	199.48	95.89	Dec., 1935	254	111
Dec., 1935	194.90	93.69	Nov. 1935	171	75
Jan., 1935	198.72	95.52	Dec. 1934	105	46
1935 (Av.)	195.22	93.84	1935 (Av.)	135	58
1934 (Av.)	198.10	95.23	1934 (Av.)	114	50
1933 (Av.)	170.18	81.80	1933 (Av.)	102	47


CONTRACTS - WEEKLY AVERAGE
Current Week
Previous 4 Weeks
1936 to Date
1935 Av. for Year
0 10 20 30 40 50 60
Millions of Dollars
CUMULATIVE CAPITAL AND ENGINEERING CONSTRUCTION CONTRACTS AS REPORTED BY E.N-R.
Millions of Dollars
1935 total incl. federal
1935 1936 Contracts
New capital
Private investment 1935
* Federal PWA withdrawals exceeded reallotments
PREVIOUS 4-WEEKS MOVING AVERAGE - CONSTRUCTION CONTRACTS AS REPORTED BY E.N-R.
1936
1935
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.

THE 1936 ROAD SHOW

A Review of the New Roadbuilding Aids that the Manufacturers Exhibited at Cleveland

(Compiled and Classified for Ready Reference)

THE most successful Road Show in the history of the American Road Builders Association was held in the underground exhibition hall of the Cleveland Public Auditorium Jan. 20-24. It was far from the largest of past shows; in fact in floor space occupied and in number of exhibits it was not much more than half the size of the 1930 Atlantic City show. However, in display of new developments in construction equipment, in interest evidenced, in serious inquiries and heavy buying, those in attendance agreed that the 1936 show led them all. Floor space occupied by 230 exhibits aggregated 2½ acres. Throngs of visitors crowded the exhibits all through the five-day session; booth attendants had not a moment's rest, and many an order was closed on the floor. By the time the show closed many of the exhibited units carried "sold" tags, and this was not mere publicity, for the actual signed and telegraphic orders were freely shown. Exceptional optimism prevailed among exhibitors as well as contractor and highway official visitors.

The 1936 show marked the return of heavy equipment, which began to disappear at the St. Louis exhibition in 1931, and was entirely lacking at the two following shows in Detroit, the last except for hotel-corridor exhibits up to this year.

At the present show concrete mixers were absent, by agreement of the manufacturers, though several truck mixers and agitators were shown; practically every other type of equipment possible to exhibit was on display.

New development revealed by the show is most marked in machinery lines, less in roadbuilding materials. A pronounced trend of equipment is that most graders, scrapers and heavy hauling units are being put on rubber, the long-popular crawler treads giving way to low-pressure pneumatic tires up to 18x24 in. in size. Other leading trends are: *First*, fast and large-capacity units with full-power operation to give maximum output at low cost are the ruling development in earthmoving equipment; power-cleared scrapers up to 24-cu.yd. capacity, and power-dumped earthmoving wagons, up to 30-yd. size, were shown, for example. *Second*, more specialized machines for individual types of operation are available, including multiple-roll smoothing rollers for accurate finishing of road wearing surfaces. *Third*, marked development has taken place in mechanical excellence, in shaping of structure and parts, in weight efficiency and distribution, in approach to machine-tool standards of design and workmanship of parts, in use of welded-plate frames and bodies, in centralization and ease of operating control. In the mechanical improvement better appearance is being obtained in general form and details as well as in finish.

* * *

Following is a description of all machines and materials on display, classified into groups according to use. The directory at the end gives the full names and addresses of the exhibitor, with a cross-reference to the groups in which their products are described. This report is compiled from a personal canvas of all exhibits.

Excavators and Loaders

CARRYING SCRAPERS are developing to huge size, as are also earthmoving wagons. Large shovels are being improved for faster operation. The small ¾-yd. shovel, light and fast, is becoming more popular than ever.

1. Crawler Shovels:

Northwest has produced a new heavy-duty ¾-yd. gas powered shovel designed for fast operation. Cast-steel bases, live and hooked rollers, welded crawler frames and full rope crowd are features. The familiar Model 70 oil-engine- powered 1¾-yd. shovel was also shown.

A new ¾-yd. full convertible all-welded shovel was displayed by Harnischfeger. This is gas powered (other power optional) and is a fast, light-weight machine with three travel speeds. The P&H pride was the Model 765 2-yd. diesel shovel, full roller-bearing-equipped and fabricated from alloy steel parts that reduce the weight 20 per cent over previous models of similar capacity. Hooked rollers and a live roller circle are standard; a live boom is optional.

Tubular shipper shafts on large shovels are a new Thew Lorain idea, displayed on a 2-yd. gas rig of new design. The crowd rack is welded to the top of a single shaft. To take the torsional stresses in the boom a tubular jack boom has been designed, extending from the shipper shaft guides to the base of the boom. Small-roller crawlers are used on this model for the

first time by Thew. A Thew Lorain Model 77 1½-yd. shovel, diesel powered and chain crowd was displayed along with a Universal Lorain ¾-yd. 17-ton gas dragline with rope and rack crowd. A sloping machine frame gives this rig a nice distribution of weight.

Bucyrus-Erie has a new Model 48-B 2-yd. diesel shovel with several interesting features including a wide-gage crawler which can be jacked inward to car-width for shipping by removal of four split collars from the crawler axles. Other features are a removable high A-frame, all-welded box boom, full roller-bearing equipped, easy-accessible grease cups, a bowl-bottom bucket with removable lip and leaf spring shock absorber on the door. The popular 10-B B-E ⅜-yd. gas shovel, full rope crowd, was shown with its special rubber-tired trailer unit, a box frame on four wheels, which can carry the rig at high speed for long-distance transportation.

Lima displayed the largest shovel on the floor, a 2½-yd. Model 901, oil-engine powered, roller-bearing equipped throughout. A Model 302 dragline, ¾-yd., carrying a Page bucket, was used as a demonstrator for one of Lima's features—convertible crawlers which can be easily changed in length for dragline or shovel operation.

Another shovel fresh from the drafting room is Koehring's new 2-yd. gas rig with a high collapsible A-frame, all-welded box boom, single chain crowd inside the boom and self-cleaning crawler treads.

Two standard models were shown by Marion, a ¾-yd. was powered Model 331, and a Model 361 diesel, both with chain crowds.

Osgood featured the Chief, a 2-yd. diesel shovel with all-enclosed cab, chain crowd and vacuum-controlled operations.

The ¾-yd. Invincible shown by General Excavator was one of the smallest shovels in the floor to be powered by a diesel engine.

Byer's contribution in new shovels is a ½-yd. gas rig with roller chain crowd, full-roller-bearing equipped and with its own detachable trailer unit for transportation. The Bearcat Jr. was also shown, a ⅜-yd. shovel, three-quarter swing with full rope crowd; it also has its own trailer unit.

A ⅜-yd. full-revolving shovel on a diesel tractor, operated from a power takeoff and having a tubular shipper shaft was shown by Speeder. This little rig has a full rope crowd, while its companion, a ⅜-yd. crawler-mounted shovel, has a chain crowd.

The Bay City booth contained two shovels, the Model 62, a 1-yd. diesel with electric starter, and the Model 20, a ⅜-yd. full-revolving gas rig weighing only 10 tons.

The Badger, a ½-yd. three-quarters swing gas shovel on crawlers was featured by Austin-Western. It has a Man-Ten steel boom and a chain crowd.

2. *Truck Shovels:*

Thew had the largest truck-mounted shovel on the floor, a Universal-Lorain ¾-yd. Model 40 on an Indiana truck. Features are a tubular shipper shaft, rope crowd and springless rear trucks.

From the Rocky Mountains came Quick Way's ½-yd. full revolving truck shovel, mounted on a Coleman truck, though it can be set on any 3½-ton truck. It is independently gas powered, has a rope crowd, can swing 7½ revolutions a minute, and has an all-welded boom.

A single tubular boom and two tubular shipper shafts are features of the Michigan ⅜-yd. truck shovel. Power for the shovel is from a takeoff from the truck motor. Truck and shovel combined weigh only 9 tons.

Universal Power Shovel showed a ⅜-yd. shovel on a truck, powered through a takeoff from the truck motor.

3. *Carrying Scrapers:*

The biggest unit on the whole floor was Le Tourneau's 24-yd. carrying scraper, a juggernaut of welded truss frames cradling three hoppers which telescope together for dumping. The ponderous rig, 60 ft. long from front of tractor to rear of frame, is entirely controlled through cables. It takes eight 18x24-in. low-pressure pneumatic tires to carry the scraper. The same idea of cable control is used in the Le Tourneau 8-yd. carryall scraper, mounted on six huge pneumatic tires.

Austin-Western has put its 12-yd. hydraulic-controlled carrying scraper on low-pressure tires. A gas engine on the rig operates the hydraulic pump. An all-welded box girder frame is a feature of the design.

The Gar Wood 12-yd. carrying scraper is also hydraulic-operated through a gas engine pump, and it is mounted on six large rubber tires. Wood showed his new model 6-yd. hydraulic scraper, also rubber mounted.

Heil revealed a brand new design of carrying scraper, called the Dig-N-Carry, of 12-yd. capacity. It is hydraulic operated through an independent engine, and is of all-welded construction. A 6-yd. scraper by Heil is a small edition of the large one, except the hydraulic pump is powered from a power take-off on the pulling tractor. Both rigs are low-pressure tire mounted.

Continental Roll & Steel Foundry is featuring a new type of hydraulic pump, used to operate its 9-yd. two-wheel trailer type wagon scraper. The pump is powered by the pulling tractor.

4. *Scrapers:*

The Blaw-Knox Dirt Mover scraper, trailer type on rubber tires, now has its hydraulic control cylinder on a universal joint mounting to provide better leveling.

Killefer displayed three sizes of rollover scrapers, 1 yd., 50 ft. and 2½ yd., all controlled from the tractor seat. LaPlant-Choate had a 6-yd. trailer scraper on two rubber wheels. The familiar Tumblebug rollover scraper was shown by Baker.

5. *Bulldozers, Trailbuilders:*

Note: Trailbuilders is the term applied here to all types of tractor-mounted graders of the bulldozer type having adjustable boards for angle grading. This type of grader board is fastened to the frame through a swivel connection at the center, and the side members of the frame are adjustable in length.

LaPlante-Choate showed a bulldozer hydraulic-controlled through a pump powered from a power takeoff on the front of the tractor, and a heavy-duty trailbuilder hung from a diesel tractor.

Blaw-Knox has developed a new type of hydraulic control for its bulldozer in which the cylinders are mounted on a swivel on the sideframe, instead of being rigidly mounted, in such manner as to utilize the reaction of the cylinder thrust to lifting advantage, thereby cutting the working pressure required for blade operation down to 75 lb.

Continental Roll & Steel Foundry utilizes a double hydraulic jack arrangement for its bulldozer. Austin-Western features tubular sideframes for its trailbuilder. Gar Wood showed several sizes of bulldozers and trailbuilders on various makes of tractors, all hydraulic-operated. Heil displayed a hydraulic trailbuilder.

Le Tourneau carries the cable operation of dirt moving equipment into bulldozers and trailbuilders, the bulldozer being operated from a power takeoff hoist on the front of the tractor, the trailbuilder from frame overhanging the tractor, powered by a rear hoist.

Baker believes in putting the hydraulic cylinders for controlling its bulldozer in a vertical position; they actuate a cradle frame. Two sizes were shown, one with an unusually large moldboard, which is removable for attaching a snowplow blade.

Bucyrus-Erie has entered the bulldozer field with a new design of high lift hydraulic-operated blades carried by all-welded frames which can be attached to the tractor without drilling or tapping any holes. The B-E trailbuilder is smaller than most units of this type.

6. *Graders, Planers, Rooters:*

Austin-Western showed the 77 Senior motor patrol, dual four-wheel drive, gas drive, mounted on rubber tires and carrying a 14-ft. blade, all operations hydraulic-controlled, an A-W feature on graders. The Austin-Western No. 10 pulled grader, carrying a 12-ft. blade, is also hydraulic-controlled through an independent gas-driven pump.

Galion Iron Works featured a diesel motor patrol grader, mounted on pneumatic tires, duals in the rear, with hydraulic controls. A companion grader was the Galion pulled grader, steel wheeled, hydraulic-operated through an independent gas engine. Huber showed only one grader, the No. 4 motor patrol, hydraulic-operated. The Warco Roadhog was the sole exhibit of the Riddell Co.; this is a motor patrol grader with an Octopus eight-wheel rubber-tired drive, carrying a 12-ft. blade. Steel lugs on chains can be placed over the drive wheels to create a crawler tractor effect, or can be wrapped around individual drive wheels as traction lugs.

A new heavy-duty motor patrol grader was featured by Adams, powered by a diesel tractor engine. The drive is through eight rubber-tired wheels of four duals set in tandem. The Adams leaning wheel pulled grader received lots of attention, for an operator put the grader through its paces while a loudspeaker announced the various operating features. Shaft control of each operation, even to steering of the tongue, is through a gear assembly powered by an independent gas engine. Both the pulled grader and patrol grader frames are welded box girders.

Rome has a new motor patrol grader, gas driven, on rubber tires. It carries a 12-ft. blade and the usual scarifier. The Rome hand-controlled pulled grader, an 8-ft. heavy-duty model, is on hard rubber tires. Its blade is easily adjusted to steep sloping. Allis-Chalmers also exhibited a pair of graders, the Model 54 Speed Patrol on pneumatic tires, carrying a 12-ft. blade; and a 14-ft. blade power-controlled pulled

grader on steel wheels, the operating power being furnished by an independent gas engine.

York showed a pulled grader and maintainer, called the Super Workman, pneumatic tired mounted. In place of the usual single adjustable blade, this grader is equipped with two blades, a scarifier and a rake, all mounted on one frame and operated by hand.

Caterpillar's grader line was headed by a diesel motor patrol, single tandem drive, designed for roadbuilding as well as for maintenance. It is a heavy-duty unit carried by a welded double box frame. The front axle is extra long for better control on grading. The scarifier is V-shaped, and the unit carries a 14-ft. blade. Four other graders were shown, all of the pulled type. Newest is the hand-operated No. 22, carrying an 8-ft. blade, mounted on steel wheels and with a box girder frame construction. The No. 66 grader, on steel wheels, is power-controlled through an independent gas engine. The No. 4 is a one-man machine, for it is operated from the tractor seat. It carries an 8-ft. blade, and is mounted on hard rubber tires. The Trailer Patrol carries a 12-ft. blade, and can be power controlled from the tractor seat or hand-operated from the rear, both arrangements being built into the unit.

Two styles of rollover road rippers were on the floor. Continental Roll & Steel Foundry has a ripper that rolls over automatically as the rig is backed up, for clearing stumps and other obstructions or for cleaning. Killefer showed heavy-duty and standard models of a revolving ripper, on which the teeth rise into a clear position through a control arrangement from the tractor seat. Non-revolving rippers were also shown by Killefer. The Killefer road planer was the only machine of its type on the floor. This a series of four sets of 20-in. gang disks hung from a heavy frame, pulled by a tractor.

Baker exhibited a straight grade rooter and a disk grader attachment for the moldboard of a blade grader. Hargrave had a similar moldboard disk attachment, and also showed a disk grader planer for mounting on the circle of any grader or motor patrol.

The only subgrader on the floor was by R. B. Equipment. This was a power rig with oscillating teeth that dig up the subgrade, passing the excavated material back to a scraper conveyor that carries it off to the side of the road. The machine is powered by a gas engine, and is pulled ahead by anchored cables. R. B. also showed a new form grader, gas-powered front drive, that cuts a trench 16 in. wide for steel road forms. A rear roller smooths off the trench bottom.

7. *Elevating Graders, Loaders:*

Caterpillar alone displayed an elevating grader, its Model 48 gas-powered grader mounted on drum-type steel wheels. This model is rated at 5,000 cu. yd. daily capacity.

Haiss and Barber-Greene each displayed gas-powered, crawler-mounted bucket loaders. Three models of tractor shovel-type loaders were shown, two by Hough and one by Trackson.

8. *Buckets:*

Dragline bucket displays included a 1½-yd. size by Bucyrus-Erie, a 1-yd. Williams by Wellman, a 60-ft. Northwest and a small ⅜-yd. by Harnischfeger. In clamshells Wellman had the long-familiar Williams Favorite and Type MF in ¾-yd. sizes. Owens showed a 1-yd. digger and Blaw-Knox displayed the ¾-yd. Dreadnaught.

9. *Snowplows:*

The most elaborate snowplow shown was the truck-mounted Snogo rotary by Klauer. This machine has three revolving spiral collectors which gather the snow and then pass it into a high-speed fan blower. The blower delivers the snow far to either side of the roadway or into trucks for disposal. The plow is mounted on a FWD truck carrying a separate large gas engine for operating the spirals and fan.

The more prosaic but popular plow type of snow remover was offered by Baker in the straight V and offset V models; by Heil in a truck V model; by La Plant-Choate in a V40 model on a diesel tractor and another hydraulic-operated tractor model with adjustable wings; by Walter in a Walter-Frink offset truck model with a long wing.

10. *Hoists and Conveyors:*

Several styles of tractor hoists were shown by Williamette-Hyster, including single and double drum models mounted on the rear of gas and diesel tractors, powered from rear power takeoffs. Barber-Greene and Chain Belt both displayed belt conveyor equipment.

Haulage Units and Rollers

THE principal developments in haulage equipment have been the trend toward larger units and the swing to low-pressure pneumatic tires for these big units, which were formerly carried on crawlers. Road rollers seem incomplete today without a third roll of some kind for the final touch in smoothing bituminous surfaces.

11. *Wagons and Truck Wagons:*

The largest wagon unit on display was the 30-yd. Le Tourneau Crade Dump Buggy, a trailer unit hooked to a Model 100 Hug Lugger. The rear of the trailer is carried by four 18x24-in. tires; the front end rests on the Lugger chassis, which is diesel powered and is mounted on six tires of the same large size. A fixed curved plate forms the bottom of the dump wagon; the body tilts to either side in dumping, scraping the load off the curved bottom. Power for dumping is through a takeoff from the chassis engine, and dumping operations are cable controlled. Hug also displayed the Hug Lugger Model 95, diesel powered chassis similar to the Model 100, but carrying a 12-yd. end-dump scoop end body, which tilts to a dumping angle of 77 deg. The rig is mounted on six 18x24-in. tires, with an extra pair of 11¼x24-in. tires under the center of the body.

Athey showed a 14-yd. side-dump trailer wagon, mounted on a Forged-Trak crawler, hydraulic-controlled, and a 12-yd, crawler bottom-dump wagon, closed by hand winding.

A newcomer in the wagon field is the Koehring Trail Dump, an all-welded 7½-yd. trailer wagon, bottom dump, with ratchet wind-up powered off a cam on the axle. The wagon is rubber mounted, and is hauled by a Koehring rubber-tired tractor. A feature is the connection between trailer and tractor, set ahead and below the tractor axle to prevent overturning of the tractor. The familiar 6-yd. front end dump Dumptor unit was shown, mounted on the same type tractor that pulls the Trail Dump.

A two-wheeled 7½-yd. trailer wagon, rubber mounted and hooked to a rubber-tired tractor was shown by Allis-Chalmers. A feature of this rig is the closing arrangement for the bottom dump doors, a hydraulic cylinder operating chains for pulling the doors back into place. A clever design of cylinder allows the doors to open full almost instantly.

La Plant-Choate also showed a hydraulic-closed bottom dump wagon in a 16-yd. size, mounted on four 18x24-in. tires. Each of the two bottom dump doors is closed by a separate cylinder mounted on the side of the wagon, powered by a pump on the tractor.

Euclid displayed two wagons, one an 8-yd. end dump mounted on a Trac-Truck tractor with six rubber-tired wheels. The other was a 9-yd. side-dump Trac-Truck trailer unit, both tractor and wagon being rubber mounted.

A 5-yd. trailer, bottom dump wagon, with wind-up power taken from the axle, was shown by Insley, hooked to a Marmon-Herrington all-wheel drive truck tractor.

12. Trucks, Bodies, Trailers:

The Hug 87Q Roadbuilder, a 6-yd. end dump body on six rubber wheels was one of the largest truck units on display. Four Wheel Drive showed a heavy-duty dump truck fitted with a maintenance grader blade suspended under the truck body.

International's truck display included ½-yd. and 1½-yd. dump trucks, a 7-ton chassis, and a 5½-ton chassis fitted with an Aristocrat 10-yd. aluminum dump body, the only aluminum body on display at the whole show. General Motors had five trucks on hand, ranging from the ½-yd. pick-up model to the Model T18 truck unit, a large dump truck with curved front end body and equipped with dual performance rear axle, all GMC trucks being an entirely new line.

Four-point four-wheel drive trucks were displayed by Walter, a Model FBS 150 h.p. with a 6-yd. dump body, and a Model FMD, 110 h.p. with a 3-yd. dump body. Chevrolet showed the new 1½-ton truck with full floating rear axle and hydraulic brakes, and a Suburban Carryall designed for engineers and surveyors, seating eight people.

White-Indiana featured the White 3-yd. Roadbuilder truck with dump body, the Indiana 1½-yd. dump truck and the Model 691 White heavy-duty tractor truck equipped with air brakes. Reo had three models on display, including the Speed Wagon carrying a 1½-yd. dump body, a 2½-yd dump body model and a new heavy-duty truck with dual rear wheels and a gross load rating of 17,000 lb. Freuhauf featured its truck trailer unit carrying a dump body.

Five manufacturers of truck dump bodies had displays of their own, in addition to calling attention to their bodies on truck displays throughout the show. Anthony showed two 2½-yd. models, one of longer length and lower side heighth than is usual, and in addition displayed the vertical booster hoist for mounting behind the cab for auxiliary lifting. Heil displayed a 2-yd. and a 4-yd. body; St. Paul Hydraulic Hoist a 2½-yd. high dumping angle model; Galion Allsteel Body two models; Commercial Shearing & Stamping a three-way 3-yd. dump body, a standard 2-yd. model and a 5-yd. down-folding contractors' end dump model.

13. Tractors:

There were about three dozen tractors of all makes, sizes and types of engines on display, some mounted on rubber tires, others on the familiar crawler treads. Diesel engines predominated, though there was considerable display of oil and distillate motors. International Harvester had five tractors on exhibition, one diesel and four gas, ranging from the small Model T12 to the large T40; two of the five were on rubber. Deere featured its line of two-cylinder horizontal distillate-burning engine tractors, showing three, a 16 hp., 26 hp. and 42 hp., all on rubber tires.

Six tractors, two of them on rubber, were shown by Allis-Chalmers, including the Model I-4 four-speed and the 50-hp. Model K with full enclosed cab; a 50-hp. and an 80-hp. contained oil engines. Cleveland covered a lot of floor space with eleven Cletracs, many of them fitted with bulldozers or hooked to other equipment. One 35-hp. model was equipped with an air-cooled air compressor; another was a duplicate of the tractor Admiral Byrd used on his second Antarctic expedition, surrounded with dog sleds, parkas, boots and other cold-weather paraphernalia. A small model was equipped with rubber crawler treads; another was also so equipped, but with narrow-gage crawlers. Most of the Cletracs were gas-powered, though several diesels were shown.

Caterpillar featured its full line of diesel tractors, showing all four sizes ranging from the high-speed 35-hp. to the large six-cylinder 95-hp. model. Though the diesels vary in number of cylinders, they are all fitted with standard bore and stroke engines, making many parts interchangeable. Several gas Caterpillars were also seen. One rubber-tired tractor was displayed by Case, a 58-hp. industrial model capable of operating either on gasoline or No. 1 or No. 2 fuel oil.

14. Rollers and Tampers:

At first glance it seemed that a locomotive got into the Buffalo-Springfield exhibit by mistake, but closer inspection revealed that it was only a huge three-axle tandem gas-driven road roller, designed especially for blacktop pavements. Two of the rolls are fixed to the frame; the third one at the front is swivel-connected, but can be locked in a rigid position if desired. A standard three-wheel 10-ton roller stool in the shadow of the three-axle tandem, equipped with a small Interoll dragging along behind, and a small 3-ton tandem brick roller was used as a chocking block for the big roller in this exhibit.

The trend toward sidewalk installation along highways was evidenced by the C. H. & E. 2-ton tandem roller designed especially for rolling these walks. Galion Iron Works featured three rollers, one a new design single-roll portable carrying its own two-wheel trailer; the other two shown were a 10-ton tandem and a 10-ton three-wheel roller, both gas powered.

A 7-ton three-wheel roller with a Tru-Plane third roller, hydraulic-controlled, was shown by Huber, along with a 10-ton three-wheel with hydraulic scarifier attachment. Austin-Western attached a Roll-a-Plane center roller to its standard 10-ton three-wheel roller, gas powered. Ironer Roll is the name given by Osgood to the Hercules 10-ton three-wheeler; hydraulic steering is another feature.

A pulled tamping roller (otherwise known as a sheepsfoot roller) was shown by Blaw-Knox, the only one on the floor. This is a double roller with tie bars both front and rear to which the rolls are fastened with oscillating connections.

15. Road Sweepers:

The few sweepers on hand were almost lost among the tractors and graders, but Hough made an impression with a combination sweeper and blower, a trailer unit, rubber mounted and gas powered. The idea is that the sweeper removes the coarse material from the road, while the blower, directed at the pavement at the rear of the rig, clears off the dust with a blast of 10,000 cu.ft. of air per min. Straight trailer mounted sweepers and self-powered blowers for truck mounting were also shown by Hough. Hargrave believes in sucking up the road dirt with a vacuum road sweeper, rather than blowing it away, and displayed a trailer-mounted rig for this purpose. It will load into an accompanying truck if desired.

16. Material Spreaders:

Blaw-Knox has combined a road material spreader with a sort of finishing machine. This rig has a hopper box which receives any kind of material from a dump truck—concrete, hot or cold bituminous mixes, stone, gravel, slag or sand—and a V-plow for spreading the material, which is struck off by a template. The whole rides on a rigid frame mounted on four wheels and two long skids, and is pulled along by the truck.

Buckeye Traction Ditcher has a new style surface material spreader for use with dump trucks. Universal Crane confined its exhibit to a differential disc spreader on two rubber tires, pulled by the truck that feeds it. The disc feed can be regulated to throw any amount of material up to 100 lb. per sq.yd.

Concrete and Aggregate Equipment

MIXERS and pavers were absent, but there was considerable concrete equipment on hand to remind the visitor that concrete roads are still being built. Truck mixers and agitators pinch-hitted for the pavers. Crusher and screening exhibits were relatively scarce as measured by previous shows.

17. Truck Mixers:

Three truck mixers of small capacity were displayed. Jaeger showed a 1½-yd. two-speed Dual Mix transit mixer with independent gas power, mounted on a Ford truck. The Rex 1½-yd. MotoMix, also on a Ford Truck and having two mixing speeds independently powered was shown by Chain Belt. Blaw-Knox kept in line with a 1-yd. transit mixer mounted on a Ford truck, also independently powered.

18. Pavement Screeds:

Jaeger had two finishers on the floor, one a standard concrete road screed with bituminous attachments; the other a Lakewood Vibratory concrete finishing machine with internal vibration. A gas-electric double screed and electric vibrating finishing machine for concrete roads was displayed by Blaw-Knox. It is a four-wheel drive with electric hoists for handling the screeds. Five electric motors for all operations are powered by a gas-electric generating set.

Electric Tamper has fitted up one of its heavy Jackson electric vibrators as a two-man vibrating screed for roads, bridge decks and floors. Heltzel played with a model of his concrete finishing machine.

19. Concrete Handling:

One of the outstanding hits of the show as far as interest was concerned was the Chain Belt Pumpcrete exhibit. A Model 200 Pumpcrete machine pumped concrete (lime mortar for demonstration purposes) continuously through a pipeline looping the loop far above the heads of the spectators. This line contained 630 deg. of curvature,

and was composed of all the various connections, gates and valves necessary for Pumpcrete operation. A Siamese connection for twin-pump installations, flexible hose pipelines and connections, and the Go-Devil pipe cleaner were shown on the side.

Blaw-Knox showed a 1-yd. roller gate bottom dump concrete bucket designed for easy controllable dumping. French displayed a new idea in paver buckets, one fitted with a bottom dumping frame that is vibrated by an attached motor. A model of a concrete spreader, fed by a dump truck, with a screw spreader and horizontal vibrating screeds shown by French created considerable interest. Insley showed its conical bottom concrete hopper, conical bottom dump bucket and a low rubber-tired concrete buggy.

20. Batchers, Bins, Scales:

Butler exhibited its standard three-material weighing batcher and a line of bin gates for sand, stone and cement. Blaw-Knox indicated a trend away from full-automatic batching plants by displaying a new design semi-automatic plant, in which the weighing hoppers are charged and dumped manually, only the cutoff on the charging being automatic through beam scale cutoffs. Dial platform scales were shown by Cummer, Heltzel and Fairbanks-Morse, the last also displaying a four-beam platform wheelbarrow scale.

21. Concrete Vibrators:

Every type of internal and external concrete vibrator was on display, including air, electric and gas powered models. Mall showed a new shaft-drive internal vibrator. Concrete Surfacing Machinery entered the vibrating field with two models, 1¾-in. and 5-in. sizes, shaft driven and interchangeable on the same power unit. Chicago Pneumatic and Ingersoll-Rand have new type air-operated internal vibrators. Master Vibrator showed an internal electric drive vibrator.

Electric Tamper & Equipment has about all that one could desire in the way of electric vibrators, external and internal, large and small. The internal line ranges from the small wall type to a large 6-in. two-man machine. External models include pipe, form and the original foot vibrators.

22. Grinders and Tampers:

Electric grinders and finishers were shown by Mall. Concrete Surfacing Machinery displayed the full line of Berg finishers, grinders and cleaning tools, all interchangeable for attaching to the same gas power unit. Electric Tamper & Equipment displayed a full line of electric grinders and cleaners, also a new 75-lb. backfill tamper with interchangeable clay spade and asphalt breaker attachments.

23. Core Drills:

Sullivan showed a self-propelled pavement drill for mud-jack work, which has a larger drill attachment for taking test cores of pavements mounted on a small four-wheel truck. Ingersoll-Rand mounts its 8-in. Calyx drill for pavement test cores on a truck, though it is equipped with independent gas power for operating the drill.

24. Aggregate Screens:

Symons-Cummer horizontal vibrating screens for central plant installations were shown by Cummer. Iowa had a vibrating screen on display, as also did Pioneer. Tyler featured the Tyler-Niagara vibrating screen and screen wire, along with laboratory testing screens.

25. Crushers:

Austin-Western displayed a complete portable crushing plant on hard rubber wheels, powered by a gas engine, and containing a 12x20-in. jaw crusher feeding into a 20-ft. folding bucket elevator. Iowa showed a 10x36-in. belt-drive roller bearing jaw crusher and a 30x18-in. belt-drive roll crusher. A belt-drive sand roll by Pioneer, a 10x20-in. jaw crusher and a 30x16-in. corrugated roll crusher by Universal Crusher, and a jaw crusher by Good Roads completed the crusher exhibits.

Bituminous Equipment

APPARENTLY more bituminous equipment was on display than at any previous road show, indicating the trend toward low-cost road surfacing and the interest being displayed in betterment of the secondary road system.

26. Bituminous Distributors:

Four large tank distributors were on the floor. Brown has a new idea in a 2,500-gal. Brown-King Hi-Speed trailer model, which has four wheels at the rear (none on the front) each with a separate axle connected to the frame at the opposite side of the trailer through a ball-and-socket joint. This axle arrangement is for the purpose of keeping the spray bar horizontal at all times and at the desired distance above the roadway. Entyre showed a truck-mounted distributor, 2,000 gal. capacity, featuring a bike fifth wheel tachometer.

The streamline craze has hit even the prosaic bituminous distributor, for Kinney's 2,000-gal. model now has an oval tank streamlined with the dual-axle drive White truck on which it is mounted. Kinney says the design lowers the center of gravity of the full load. Littleford has a 1,000-gal. distributor on a dual-axle Indiana truck, and also showed a Utility spray tank on a two-wheel trailer truck. Rosco likewise showed a small distributor on a two-wheel truck, and featured a model of a large distributor tank with a new sectional distributor bar and a seven-way valve.

27. Heaters and Mixers:

Small heaters and mixers for patching work, mounted on two-wheel trailers were shown by Chain Belt and Koehring. Cummer displayed a large 2-ton steam-jacketed asphalt mixer, electric drive, for central plants. Cleaver-Brooks exhibited a four-wheel model and a two-wheel model of its line of asphalt tank car heaters. Littleford displayed a bituminous maintenance heater mounted on two pneumatic-tired wheels.

28. Roadbuilders, Screeds:

The new Adnun blacktop paver was shown by Foote. This is a self-propelled unit that will handle hot or cold mixes or stone. It receives material from a dump truck into a hopper and spreads over a width of 10 ft. A sliding bottom gate regulates the flow of material onto the roadway. No forms are required with this spreader.

Jaeger showed two bituminous pavers, one the standard machine riding on crawlers, self-propelled. The other is the Jaeger Roadbuilder, a triple pug mill for stabilized road construction and bituminous retread work. It is self-propelling on hard rubber wheels and contains mixer blades, the triple pug mill revolving blades and spreader blades.

Compressed Air Equipment

PRINCIPAL DEVELOPMENTS in the compressor and rock drill field include a trend toward diesel operation of portable compressors, air-cooled compressors and universal self-feed mountings for drifter drills. Portable compressors are expanding to larger sizes than ever before.

29. Compressors:

The largest portable compressor on the floor was a new 420-ft. Gardner Denver, a two-stage water-cooled unit powered by a diesel engine, mounted on four hard rubber tires. A 105-ft. standard gas-powered portable was shown along with the bigger unit. Chicago Pneumatic featured a 315-ft. portable diesel-drive two-stage air-cooled compressor, and also showed a two-stage air-cooled unit driven by a gas engine. Davey mounted one of its 105-ft. two-cylinder air-cooled portables on a motor truck, where it was driven through a power takeoff from the truck motor, and showed a 160-ft. air-cooled unit on a four wheel truck, driven by a Domark air-cooled engine.

Schramm has come out with a new 210-ft. high-speed diesel drive utility portable on pneumatic tires. Other Schramm portables on display were a 105-ft. single-stage gas driven, a 38-ft. Junior Utility, gas driven and mounted on two wheels, and a standard 210-ft. two-stage gas driven on four steel wheels. LeRoi had the LeRoi-Rix line of portables on hand, including a new 160-ft. two-stage three-cylinder air-cooled model powered by a new LeRoi gas engine, and the super-charged SS 210-ft. water-cooled gas engine with a 6-hp. gas engine starter. Chrysler is in the compressor field with a two-wheel portable of 111-ft. capacity, powered by a four-cylinder Plymouth motor. The compressor sets alongside the motor, and is identical with the motor up to the head and manifold. It has mechanical valves and a separate water cooling system.

Worthington featured a 210-ft. three-cylinder air-cooled portable, gas driven, mounted on four wheels, and a smaller 105-ft. unit of similar design on two wheels. The latter was also shown in the stationary

model. Air-cooled portables were shown by Sullivan, one being a 210-ft. diesel two-stage four-cylinder unit; another was a 105-ft. gas driven two-stage two-cylinder unit. Sullivan also displayed a two-stage 105-ft. air-cooled stationary unit with a built-in electric motor. Ingersoll-Rand showed three portables, one a large 315-ft. two-stage air-cooled gas driven, one an identical unit oil engine drive, and the third a trailer type 105-ft. two-stage gas drive.

30. Drills, Breakers, Etc.:

A full line of rock drills, paving breakers, clay spades, sheeting hammers, air hoists and other air tools were on display by Ingersoll-Rand, Chicago Pneumatic, Worthington, Gardner-Denver, Sullivan and Cleveland.

31. Drill Bits and Steel:

Sullivan has come out with a new type of detachable bit, in which the face is a combination chisel and wing bit, difficult to describe, but far from difficult to grind because of its peculiar shape. Timken had its full line of detachable bits on hand in all styles of face and in all sizes. Ingersoll-Rand had a board full of Jackbits. Kalman displayed its standard hollow drill steel.

32. Drill Mountings:

The six large drill manufacturers have all come out with automatic self-feed universal mountings for drifter drills. They are all on three-wheel frames, and are adjustable for drilling in any position. Their main difference is in type of feed, which will be described for each. Ingersoll-Rand used a chain feed driven from a separate air motor through a regulating throttle control of the motor. Sullivan uses a double-cylinder air feed with the feed bar mounted between the cylinders. The Cleveland feed is a chain actuated by an air cylinder. A 2-to-1 pneumatic feed working through a rack and pinion crowd is a feature of the Gardner-Denver mounting, which also has a spilt collaring device. Chicago Pneumatic relies on a screw feed actuated by the kick of the drill which operates a ratchet rotating device to turn the screw. Worthington's feed is a long air cylinder, the rig also being equipped with an automatic collaring device.

In addition to the universal mountings described above, Cleveland and Worthington apply the same feed principles to larger, though not universal mountings, for certain drilling tasks. Ingersoll-Rand and Gardner-Denver showed standard wagon drill mountings, and Worthington had a drifter mounted on a standard tripod.

33. Grinders and Sharpeners:

Ingersoll-Rand displayed the Jackbit grinder, a regular bit sharpener and an oil furnace. Chicago Pneumatic showed a Blount detachable bit grinder.

Pumps, Power Plants and Welders

CENTRIFUGALS are largely displacing the old piston road pump and seem to be eclipsing the long-faithful diaphragm, according to the elaborate pump displays at the show. Most of the centrifugals are now self-priming. Sump pumps of all kinds were prominent.

34. Centrifugal Pumps:

Novo showed three self-priming centrifugal pumps, all direct connected to Novo gas engines. These included a 2-in., 4-in. and 6-in. size, the last rated at 90,000 gal. per hr. Sterling featured a line of heavy-duty centrifugals ranging from a 2-in. belt drive to an 8-in. oil-engine drive. A 2-in. Built-Together electric motor and centrifugal pump, and a 4-in. Basic Rotary pump were shown by Fairbanks-Morse.

C. H. & E. had a 2-in. centrifugal on two pneumatic-tired wheels. Chain Belt displayed five of its Rex line of pumps in 2-in., 3-in. and 4-in. sizes. Gorman Rupp showed a line of centrifugals, all self-priming, ranging from 2-in. to 8-in. in size, the last diesel driven. The largest pump shown was a 10-in. diesel on four wheels by Jaeger. Other electric and gas pumps down to 2-in. size were displayed by Jaeger, including a 4-in. self-priming jetting pump for well points.

35. Road Pumps:

Only three of the familiar road type piston pumps were shown: a 2-in. duplex by Fairbanks-Morse, a 2-in. by Novo and a 3-in. triplex by Jaeger.

36. Sump Pumps:

Air-operated sump pumps on display included a 3-in. by Chicago Pneumatic and 2½-in. sizes by Ingersoll-Rand and Cleveland. Ingersoll also had a 2½-in. submersible motor pump. Mall has a new flexible shaft drive pump, and Electric Tamper & Equipment featured an electric sump pump with submersible motor.

37. Engines and Plants:

There were engines and power plants galore, and space does not permit a full listing of the individual units. A unit receiving lots of attention was the new Caterpillar V-eight diesel power plant, set at a 60-deg. V-angle and rated at 160 hp. Features are uniform-length fuel lines, independent gas engine starter and a speed control from 425 to 950 r.p.m. It weighs 7,000 lb. net. Caterpillar also showed a regular diesel plant.

Novo had two gas power plants; White featured its Pancake type horizontal 12-cylinder opposed power plant for under-cab installation in trucks; Cummins featured two diesels. Lauson showed its regular line of gas engines air cooled up to 3 hp. and water-cooled up to 5 hp., including the new ½-hp. air-cooled, 1⅝x1¼-in., weighing but 26 lb. Hercules displayed a new 30 hp. 6-cylinder diesel along with thirteen other gas and diesel models of various sizes.

Waukesha featured its Waukesha-Hesselman oil engine in four sizes from 40 to 145 hp., along with two full diesels. Continental Motors, Allis-Chalmers and Deere all displayed gas power plants of various sizes. Buda, Stover, International Harvester showed both gas and diesel units. LeRoi and Chrysler each showed one gas unit.

38. Generator Sets:

Gas-electric generator sets were displayed by LeRoi, Sterling Machinery, Electric Tamper & Equipment, and Mall.

39. Welding Equipment:

Gas welding equipment in connection with Stoodite hard-facing material was shown and operated by Air Reduction Sales, along with a Wilson 300-amp. electric arc welding machine. Adams is now marketing the remote-control arc welder it developed for its own use in fabricating road graders. Taylor-Wharton and American Manganese both showed special welding rods.

Highway Safety Equipment

SAFETY was one of the major themes of the A.R.B.A. convention, and the safety idea was carried downstairs into the exhibition hall by several displays of equipment and appliances designed to make the highways safer. Safety was also a feature of several of the educational displays (Sect. 50).

Safety appliances for the highway, such as signs, markers, guard rails of several types and spring fastenings for guard rails were stressed by the various exhibitors as contributions to safe driving. Even the manufacturers of heavy equipment talked safe roads, pointing out that their equipment would help build better, and therefore safer, highways.

40. Traffic Signals, Barriers:

Strangely enough, in contrast to past shows, stop-and-go traffic signals were mighty scarce at this show. Only one signal light was shown, by Signal Service, and that was a portable manual-controlled signal designed for contractors having one-way traffic problems on road work.

Evans Products featured its Auto-Stop barrier for railroad-crossing protection. Movies were shown depicting the manner in which the low rounded barrier rises out of the roadway at the approach of a train, effectively stopping cars that ignore its warning to stop, even though they are traveling a high speed.

41. Traffic Signs, Markers:

Reflector-type and plain roadway signs, reflector buttons and flashing lights were shown by Martindale Electric, National Colortype and Signal Service. Novo displayed the National Traffic Master Traffic Signal, a disappearing cast-iron stop sign.

with reflector buttons, set in the pavement. Normally this sign sticks up in full view, but depresses to pavement level when a car passes over it.

Littleford has a gas-powered Traf-Spray marker for painting road stripes; Wright-Dalton has one pushed by hand.

42. Guard-Rails, Accessories:

Steel-strip highway guard-rails were displayed by Tuthill Spring, National Traffic Guard (Risiflex), Truscon and Kalman Steel, along with various fastenings and fittings. Wheeling Corrugating and Wej-Lock featured cable guard fittings, and U. S. Steel had the cable for the guard-rails on hand. Pittsburgh Steel featured its steel-tape guard-rail.

Road Materials and Accessories

MATERIALS for highway construction must have reached their state of perfection some time ago, for there was very little new development in this line in evidence. Considerable interest was shown in stabilized roadbuilding, with salt, calcium chloride, bituminous materials and portland cement all competing for this class of work.

43. Surface Materials, Binders:

Prepared asphalt aggregates were shown by American Sealdrok and the Macasphalt Corp. Koppers and Barrett featured tar-road materials. The Asphalt Institute showed various types of asphalt roads and pavements in actual cross-section. Standard Oil of Ohio and Ohio Oil Co. had an array of asphalt compounds, road oils and cutback asphalts.

National Paving Brick Association had on hand samples of every type of paving brick and operated a miniature machine for de-airing brick, one of the show's novelties.

Binney & Smith showed how to color concrete by the use of their emulsified carbon black.

Salt for stabilization of roads and subgrades was advocated by International Salt's display. Calcium chloride was pushed for the same purpose by Dow, Solvay Sales and the Calcium Chloride Institute, and the last had a model of a plant for producing stabilized aggregates.

44. Culverts, Floors, Etc.:

Corrugated culvert pipe in various styles was featured by Toncan, Armco, Wheeling Corrugating and American Casting. Metal cribbing for retaining walls was shown by Armco.

Steel grid bridge floors were displayed by Truscon and U. S. Steel. Carey showed the familiar asphalt plank for bridge floors. Iron trench frames and covers and Racor Universal railroad-crossing iron pavement were featured by American Manganese.

Something new in pavement and floor material was shown by Interlake in the way of Tri-Pedal cast-iron paving blocks. These are triangular hollow blocks, 12 in. along the sides, resting on pedestals at each corner. They come in different weights and with various types of corrugations and knobs on the wearing surface. They are laid with ordinary bituminous-joint filler.

45. Reinforcing, Forms, Etc.:

Steel road forms were shown by Blaw-Knox, Heltzel and Truscon. Steel reinforcing, mesh, bar or both, was displayed by Truscon, U. S. Steel, Kalman, Pittsburgh Steel and Wheeling Corrugating. Steel armor protection for curbs was shown by American Manganese and by Godwin.

46. Joints and Joint Fillers:

Steel joints for pavements were profusely displayed by the following: Highway Steel Products, American Concrete Expansion Joint, Wheeling Corrugating, Truscon, Pittsburgh Steel, Kalman and Godwin.

Carey showed the long-known Elastite premolded joint. Johns-Manville sticks to the cork expansion joint. Ohio Oil has a poured filler. A new rubber compound, both premolded and poured, for joint fillers was displayed by McCarty Aniline.

Miscellaneous and Educational

THE CLOSING SECTION of this report cannot do more than merely list the scores of miscellaneous products and materials that were on display. The educational displays, mentioned in Sec. 50, were, in some cases, amazing, and created tremendous interest.

47. Misc. Materials and Parts:

Wire rope—U. S. Steel (also wire fence, pipe, etc.), Williamsport, Broderick & Bascom, Leschen and Macwhyte.

Automotive and tractor parts—Electric Wheel Co., steel wheels; Scintilla magnetos; Morse Chain drive chains; Motor Improvements, oil filters; West Steel Casting Co., steel wheels; Rockford Drilling, clutches; Spring Washer Industries, washers; Eaton axles; Fuller transmissions; Chicago Rawhide, packing; Bendix-Westinghouse, air brakes; Geneva steel wheels; United American Bosch, magnetos and fuel injectors; Edison, electric appliances; Twin Disc clutches; Wico ignition units; Fairbanks-Morse magnetos; Bendix, vacuum brakes and Zenith carburetors; Spicer clutches; Jaeger Lakewood crawler wheels; Commercial Shearing, hydraulic tractor pumps; Tuthill springs.

Other miscellaneous materials and parts—Novo and Jaeger well points; Hyatt and Timken roller bearings; Lufkin rules and tapes; Medusa white portland cement and paints; Black & Decker grinders, drills and load meters; Advanced Concrete Road Curing, felted burlap for concrete road curing; Hargrave disk sharpener; American Manganese, castings and shovel buckets; Taylor-Wharton alloy-iron castings; Air Reduction carbide lights; Martindale Electric Co., dust respirators and electric etching tools for marking tools; Deere and International Harvester, highway tractor-powered mowers.

Koppers showed the Skidometer, a fifth-wheel device for attaching to a car or truck to measure the skid properties of any highway surface. Koehring displayed a Mud Jack on its own small truck.

Oils and greases of all kinds were featured by Sinclair and by D-A Lubricants.

48. Literature Only:

Those firms having booths but limiting their displays to literature, photos or models only were: Sinclair (Headley Asphalt Div.) road asphalts; Portland Cement Association; C. S. Johnson concrete bins

and batchers; Guendler crushers; Diamond screening plants; Ransome concrete mixers; Barber asphalt products; Hughes-Keenan tractor cranes and truck-hoist bodies; American hoists and derricks; Construction Machinery concrete mixers; Hetherington & Berner asphalt plants; Smith concrete mixers; Hercules explosives; Farasey bituminous plants; Gar Wood hoist bodies; Sauerman slack-line cableways; Associated Equipment Distributors; Construction Equipment Association.

49. Publications:

Publications on display were: *Engineering News-Record; Construction Methods; Public Works; Pit & Quarry; Contractors and Engineers Monthly; American City; Rock Products; International Engineer; Roads & Streets.*

50. Educational:

Some of the educational exhibits were outstanding. The U. S. Bureau of Public Roads depicted the highways of the past and future by dioramas, sounded a warning against diversion of highway taxes, and showed instruments for soil-compaction tests and for prospecting for rock and aggregates.

Aetna Casualty & Surety Co. had an impressive exhibit featuring highway safety. Of chief interest were various devices for measuring a driver's reaction, color blindness, estimate of speed and susceptibility to glaring light. A talking movie on highway safety produced by the Cleveland police department was run in this booth, and a crowd was always in attendance.

Several states, as well as Cuba, Mexico and Quebec, had interesting displays. The Works Progress Administration exhibited a relief and pictorial display of the value of farm-to-market roads, prepared by a WPA art project. The U. S. Department of Commerce had a huge lighted map of the nation, showing where the road materials come from and statistics of highways for each state. The National Highways Users Conference and the American Association of State Highway Officials both had booths from which literature was dispensed.

DIRECTORY OF EXHIBITORS

Numbers Refer to Sections in which Exhibitor's Products are Described.

J. D. Adams Co., Indianapolis, Ind.—6-39.
Advanced Concrete Road Curing Co., New Haven, Conn.—47.
Air Reduction Sales Co., New York City—39-47.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.—6-11-13-37.
American Casting Co., Birmingham, Ala.—44.
American City Magazine, New York City—49.
American Concrete Expansion Joint Co., Chicago, Ill.—46.
American Hoist & Derrick Co., St. Paul—48.
American Manganese Steel Co., Chicago Heights, Ill.—39-43-44-45-47.
American Sealdrok, Inc., Chicago, Ill.—43.
Anthony Company, Inc., Streator, Ill.—12.
Armco Culvert Mfgrs. Assn., Middletown, Ohio.—44.
Asphalt Institute, New York City—43.
Athey Truss Wheel Co., Chicago, Ill.—11.
Austin-Western Road Mchy. Co., Aurora, Ill.—1-3-5-6-14-25.

Baker Manufacturing Co., Springfield, Ill.—4-5-6-9.
Barber Asphalt Co., Philadelphia, Pa.—48.
Barber-Greene Co., Aurora, Ill.—7-10.
Barrett Co., New York City—43.
Bay City Shovels, Inc., Bay City, Mich.—1.
Bendix Products Corp., South Bend, Ind.—47.
Bendix-Westinghouse Automotive Air Brake Co., Pittsburgh, Pa.—47.
Binney & Smith Co., New York City—43.
Black & Decker Mfg. Co., Towson, Md.—47.
Blaw-Knox Co., Pittsburgh, Pa.—4-5-8-14-16-17-18-19-20-45.
Broderick & Bascom Rope Co., St. Louis, Mo.—47.
Brown Sheet Iron & Steel Co., St. Paul, Minn.—26.
Buckeye Traction Ditcher Co., Findlay, Ohio.—16.
Bucyrus-Erie Co., So. Milwaukee, Wisc.—1-5-8.
Buda Co., Harvey, Ill.—37.
Buffalo-Springfield Roller Co., Springfield, Ohio—14.
Butler Bin Co., Waukesha, Wisc.—20.
Byers Machine Co., Ravenna, Ohio—1.

Calcium Chloride Assn., Detroit, Mich.—43.
Philip Carey Co., Lockland, Ohio—44-46-47.
J. I. Case Co., Racine, Wisc.—13.
Caterpillar Tractor Co., Peoria, Ill.—6-7-13-37.
Chain Belt Co., Milwaukee, Wisc.—10-17-18-27-34.
C. H. & E. Manufacturing Co., Milwaukee, Wisc.—14-34.
Chevrolet Motor Co., Detroit, Mich.—12.
Chicago Pneumatic Tool Co., New York City—21-29-30-32-33-36.
Chicago Rawhide Mfg. Co., Chicago, Ill.—47.
Chrysler Corp. (Amplex Div.), Detroit, Mich.—29-37.
Cleaver-Brooks Co., Milwaukee, Wisc.—27.
Cleveland Rock Drill Co., Cleveland, Ohio—30-32-36.
Cleveland Tractor Co., Cleveland, Ohio—3-5-13.
Commercial Shearing & Stamping Co., Youngstown, Ohio—12-47.
Concrete Surfacing Mchy. Co., Cincinnati, Ohio—21-22.
Construction Machinery Co., Waterloo, Ia.—48.
Construction Methods, New York City—49.
Continental Motors Co., Muskegon, Mich.—37.
Continental Roll & Steel Foundry Co., Chicago, Ill.—3-5-6.
Contractors & Engineers Monthly, New York City—49.
Cummer & Son Co., Cleveland, Ohio—20-24-27.
Cummins Engine Co., Columbus, Ind.—37.

D-A Lubricant Co., Inc., Indianapolis, Ind.—47.
Davey Compressor Co., Kent, Ohio—29.
Deere & Co., Moline, Ill.—13-37-47.
Diamond Iron Works, Inc., Minneapolis, Minn.—48.
Dow Chemical Co., Midland, Mich.—43.

Eaton Manufacturing Co., Cleveland, Ohio—47.
Edison Splitdorf Corp., Orange, N. J.—47.
Electric Tamper & Equip. Co., Ludington, Mich. 19-21-22-36-38.
Electric Wheel Co., Quincy, Ill.—47.
Engineering News-Record, New York City—49.
E. D. Etnyre & Co., Oregon, Ill.—26.
Euclid Road Machinery Co., Cleveland, Ohio—11.
Evans Products Co., Detroit, Mich.—40.

Fairbanks-Morse & Co., Chicago, Ill.—20-34-35-37-38-47.
J. D. Farasey Mfg. Co., Cleveland, Ohio—48.
Foote Company, Inc., Nunda, N. Y.—28.
Four Wheel Drive Auto Co, Clintonville, Wisc.—12.
A. W. French, Chicago, Ill.—18.
Fruehauf Trailer Co., Detroit, Mich.—12.
Fuller Manufacturing Co., Kalamazoo, Mich.—47.

Galion Allsteel Body Co., Galion, Ohio—12.
Galion Iron Works & Mfg. Co., Galion, Ohio—6-14.
Gardner-Denver Co., Quincy, Ill.—29-30-32.
General Excavator Co., Marion, Ohio—1.
General Motors Truck Co., Pontiac, Mich.—12.
Geneva Metal Wheel Co., Geneva, Ohio—47.
W. S. Godwin Co. Inc., Baltimore, Md.—45-46.
Good Roads Machinery Corp., Kennett Square, Pa.—24-25.
Gorman-Rupp Co., Mansfield, Ohio—34.
Gruendler Crusher and Pulverizer Co., St. Louis, Mo.—48.

George Haiss Mfg. Co. Inc., New York City—7.
Hargrave Construction Co., Cedar Rapids, Ia.—6-15-47.
Harnischfeger Corp., Milwaukee, Wisc.—1-8.
Heil Co., Milwaukee, Wisc.—3-5-9-12.
Heltzel Steel Form & Iron Co., Warren, Ohio—19-20-45.
Hercules Motors Corp., Canton, Ohio—37.
Hercules Powder Co., Wilmington, Del.—48.
Hetherington & Berner, Inc., Indianapolis, Ind.—48.
Highway Steel Products Co., Chicago Heights, Ill.—46.
Frank G. Hough Co., Chicago, Ill.—7-15.
Huber Mfg. Co., Marion, Ohio—6-14.
Hug Co., Highland, Ill.—11-12.
Hughes-Keenan Co., Mansfield, Ohio—48.
Hyatt Roller Bearing Co., Newark, N. J.—47.

Ingersoll-Rand Co., New York City—21-23-29-30-31-32-33-36.
Insley Mfg. Co., Indianapolis—11-18.
Interlake Iron Corp., Chicago, Ill.—44.
International Engineer, Cleveland, Ohio—49.
International Harvester Co. of America, Chicago, Ill.—12-13-37-47.
International Salt Co. Inc., Scranton, Pa.—43.
Iowa Mfg. Co., Cedar Rapids, Ia.—24-25.

Jaeger Machine Co., Columbus, Ohio—17-19-34-35-45-47.
Johns-Manville, New York City—46.
C. S. Johnson Co., Champaign, Ill.—48.

Kalman Steel Corp., Bethlehem, Pa.—31-42-45-46.
Killefer Mfg. Corp., Inc., Los Angeles, Calif.—4-6.
Kinney Mfg. Co., Boston, Mass.—26.
Klauer Mfg. Co., Dubuque, Ia.—9.
Koehring Co., Milwaukee, Wisc.—1-11-27-47.
Koppers Products Co., Pittsburgh, Pa.—43-47.

LaPlant-Choate Mfg. Co., Inc., Cedar Rapids, Ia.—4-5-9-11.
Lauson Co., New Holstein, Wisc.—37.
LeRoi Co., Milwaukee, Wisc.—29-37-38.
Leschen & Sons Rope Co., St. Louis, Mo.—47.
R. G. LeTourneau, Inc., Peoria, Ill.—3-5-11.
Lima Locomotive Works, Inc., Lima, Ohio—1.
Littleford Brothers, Cincinnati, Ohio—26-27-41.
Lufkin Rule Co., Saginaw, Mich.—47.

Macasphalt Corp. of America, Flushing, N. Y.—43.
Macwhyte Co., Kenosha, Wisc.—47.
Mall Tool Co., Chicago, Ill.—21-22-36.
Marion Steam Shovel Co., Marion, Ohio—1.
Martindale Electric Co., Cleveland, Ohio—41-47.
Master Vibrator Co., Dayton, Ohio—21-38.
McCarty Aniline & Extract Co., Inc., New York City—46.
Medusa Portland Cement Co., Cleveland, Ohio—47.
Michigan Power Shovel Co., Benton Harbor, Mich.—2.
Morse Chain Co., Ithaca, N. Y.—47.
Motor Improvements, Inc., Newark, N. J.—47.

National Colortype Co., Bellevue, Ky.—41.
National Paving Brick Assn., Washington, D. C.—43.
National Traffic Guard Co., Atlanta, Ga.—42.
Northwest Engineering Co., Chicago, Ill.—1-8.
Novo Engine Co., Lansing, Mich.—34-35-37-41-47.

Ohio Oil Co., Robinson, Ill.—43.
Osgood Co., Marion, Ohio—1-14.
Owen Bucket Co., Cleveland, Ohio—8.

Pioneer Gravel Equip. Mfg. Co., Minneapolis, Minn.—24-25.
Pit and Quarry, Chicago, Ill.—49.
Pittsburgh Steel Co., Pittsburgh, Pa.—42-45-46.
Portland Cement Assoc., Chicago, Ill.—48.
Public Works, New York City—49.

Quick Way Shovel Co., Denver, Colo.—2.

Ransome Concrete Mchy. Co., Dunellen, N. J.—48.
R. B. Equipment Co., Royal Oak, Mich.—6.
Reo Motor Co., Lansing, Mich.—12.
W. A. Riddell Co., Bucyrus, Ohio—6.
Roads & Streets, Chicago, Ill.—49.
Rock Products, Chicago, Ill.—49.
Rockford Drilling Machine Co., Rockford, Ill.—47.
Rome Grader & Machinery Corp., Rome, N. Y.—6.
Rosco Mfg. Co., Minneapolis, Minn.—26.

St. Paul Hydraulic Hoist Co., Minneapolis, Minn.—12.
Sauerman Bros., Inc., Chicago, Ill.—48.
Schramm, Inc., West Chester, Pa.—29.
Scintilla Magneto Co., Inc., Sidney, N. Y.—47.
Signal Service Corp., Elizabeth, N. J.—40-41.
Sinclair Refining Co. New York City—48.
T. L. Smith Co., Milwaukee, Wisc.—48.
Solvay Sales Corp., New York City—43.
Speeder Machinery Corp., Toledo, Ohio—1.
Spicer Mfg. Corp., Toledo, Ohio—47.
Spring Washer Industries, Massilon, Ohio—47.
Standard Oil Co. of Ohio, Cleveland, Ohio—43-46.
Sterling Machinery Corp., Kansas City, Mo.—34-38.
Stover Mfg. & Engine Co., Freeport, Ill.—37.
Sullivan Machinery Co., Chicago, Ill.—23-29-30-31-32.

Taylor-Wharton Iron & Steel Co., High Bridge, N. J.—39-47.
Thew Shovel Co., Lorain, Ohio—1-2.
Timken Roller Bearing Co., Canton, Ohio—31-47.
Toncan Culvert Mfg. Assn., Youngstown, Ohio—44.
Trackson Co., Milwaukee, Wisc.—7-12.
Truscon Steel Co., Youngstown, Ohio—42-44-45-46.
Tuthill Spring Co., Chicago, Ill.—42-47.
Twin Disc Clutch Co., Racine, Wisc.—47.
W. S. Tyler Co., Cleveland, Ohio—24.

United American Bosch Corp., Springfield, Ill.—47.
United States Steel Corp., Subs., Chicago, Ill.—42-44-47.
Universal Crane Co., Lorain, Ohio—16.
Universal Crusher Co., Cedar Rapids, Ia.—24-25.
Universal Power Shovel Corp., Milwaukee, Wisc.—2.

Walter Motor Truck Co., Inc., Ridgewood, N. Y.—9-12.
Waukesha Motor Co., Waukesha, Wisc.—37.
Wej-Lock Co., Centralia, Mo.—42.
Wellman Engineering Co., Cleveland, Ohio—8.
West Steel Casting Co., Cleveland, Ohio—47.
Wheeling Corrugating Co., Wheeling, W. Va.—42-44-45-46.
White Motor Co., Cleveland, Ohio—12-37.
Wico Electric Co., Springfield, Mass.—47.
Willamette-Hyster Co., Portland, Ore.—10.
Williamsport Wire Rope Co., Williamsport, Pa.—47.
Gar Wood Industries, Inc., Detroit, Mich.—3-5-48.
Worthington Pump & Machinery Corp., Harrison, N. J.—29-30-32.
Wright Dalton Machinery Co., Inc., Durham, N. C.—41.

York Modern Corp., Unadilla, N. Y.—6.

CONSTRUCTION REPORTS

WATERWORKS

PROPOSED WORK

★ **Ark., Little Rock**—City final plans nearing completion for new water supply system, $3,500,000. Burns & McDonnell Eng. Co., 107 West Linwood Blvd., Kansas City, Mo., engrs. Noted Nov. 13, C. D.—Nov. 21, E. N.-R.

Calif., Vallejo—City making specifications replacing 6,000 ft. pipe in Gordon Valley Pipe Line, with 24 in. c.i. pipe. P.W.A., allotted $30,150 to aid in financing. T. D. Kilkenny, city engr. Noted July 17, C. D.—July 25, E. N.-R.

Ind., Princeton—Princeton Water Works, C. Hurst, supt., soon takes bids constructing pumping station and filter beds. $40,000. R. N. Moore & Co., Inc., 930 Indiana Pythian Bldg., Indianapolis, engrs.

Kan., Mound Valley—A. Mayer, mayor, rejected bids Jan. 15, dam and intake, filtration plant, distribution system and steel tank towers, $50,000. Will readvertise. A. C. Moore, Joplin, Mo., engr. Noted Jan. 10, C.D.—Jan. 16, E.N.-R.

Mass., Quincy—City, E. C. Sargent, comr. P. Wks., City Hall, soon takes bids constructing 2 m.g. steel storage tank on Cranch Hill, $90,000. Metcalf & Eddy, 1300 Statler Bldg., Boston, engrs.

Minn., Scanlon—Village voted $9,000, furnishing materials and installing distribution line about 2 mi. c.i. pipe between Scanlon and Clouquet. $25,000. J. Wilson, 600 Torrey Bldg., Duluth, engr. Noted Dec. 4, C. D.—Dec. 12, E. N.-R.

N. J., Brigantine — Town plans repairing, painting, etc., south water tank of Brigantine water supply system. $12,113. W.P.A. project. G. L. Phillips, Boardwalk National Arcade Bldg., Atlantic City, engr. Noted July 3, C. D. —July 11, E. N.-R.

★ **N. Y., Eastchester**—Town Bd., Village of Eastchester, Village Bds. of Tuckahoe and Bronxville have passed resolutions to purchase New Rochelle Water Company for about $1,500,000 and establish municipal water supply system to serve 3 communities. A commission will be appointed and later will purchase new equipment, incl. pumps and appurtenances, to reduce fire hazard.

N. Y., Niagara Falls—City rescinded contracts awarded for constructing water intake pipe and crib at City Pumping Station, Buffalo Ave., on advice from P.W.A. Will revise plans and take bids probably in February. $159,414. Noted Dec. 19, C. D.—Dec. 26, E. N.-R., under "Contracts Awarded."

★ **O., Cincinnati**—City soon takes bids complete rebuilding present filter plant. $1,000,000. Burns & McDonnell Eng. Co., 107 West Linwood Blvd., Kansas City, Mo., engr.

Ore., Florence—Mary T. Anderson, city recdr., rejected bids Jan. 15, constructing waterworks system. Will readvertise. Noted Jan. 8, C. D.

R. I., East Smithfield — Town, Water District, Town Hall, drawing revised plans water system for Esmond Village. $186,000. Jenks & Ballou, 2600 Industrial Trust Bldg., Providence, engrs. Noted June 6, C. D.—June 13, E. N.-R.

Wash., Everett—City plans installing 12 in. watermain in Legion Memorial Park from Fifth St. for distance of 1,300 ft. Approved by City Council. G. G. Paine, City Hall, engr.

Wash., Montesano—Town plans extending water system to Central Park. $50,000. Engineer not appointed. E. Nepple, mayor.

Wash., Seattle—City plans 16 in. c.i. mains in 26th Ave. N., $8,000; also 8 in. watermains, recommendation of water superintendent for organization of improving district along Fairview Ave. N., between Aloha St. and University Bridge, now before City Council. $40,000. T. R. Beeman, County-City Bldg., engr.

BIDS ASKED

Ind., Bluffton—City in market for gasoline engine pump at waterworks plant. $800.

Mass., Braintree—See "Contracts Awarded."

★ **Mo., St. Louis**—Feb. 21, by Bd. P. Service, City Hall, constructing 60 in. welded steel water pipe line about 8 mi. from Howard Bend Water Works Station on Missouri River at Pine to Stacey Park Reservoir. $820,000. P.W.A. project.

N. Y., Albany—Feb. 3, by American Scenic & Historic Preservation Society, 287 Convent Ave., New York, driving well to provide water supply in John Boyd Thatcher Park, near here.

N. Y., Long Island City—Feb. 3, by M. P. Davidson, comr. Water Supply, Gas & Electricity, Municipal Bldg., New York, furnishing, delivering, laying steel and c.i. watermains and appurtenances in Astoria and Ditmars Blvd., Steinway, 45th and 70th Sts., 1st and 2nd Wards, Queens Boro.

N. Y., Middletown—See "Sewerage and Waste Disposal."

O., Middletown—Feb. 7, by Comrs. Butler Co., furnishing 5,491 lin.ft. 12¾ in. O. D. spiral welded pipe, 7 c.i. valves, 2- to 12-in., 7 valve chamber tops, 11 fire hydrants, 3,300 lin.ft. copper tubing, for Amanda Sewer Dist., Lemon Twp. Sewer. $30,000 incl. labor. Work by W.P.A. labor. F. Hammerk, Court House, Hamilton, engr.

Ore., Canyon City—Feb. 7, by City, constructing waterworks facilities, incl. 18,500 lin.ft. 4 in. O.D. steel water supply line, 200,000 gal. concrete reservoir.

Tex., Buffalo—Feb 11, by City, waterworks, incl. new well, pump, pumphouse and equipment, elevated tank, distributing system, 15,100 ft. 2- to 8-in. pipe. $32,000. Southwest Eng. Co., Littlefield Bldg., Austin, engrs. Noted July 1, C. D.

Utah, American Fork — See "Contracts Awarded."

Utah, Murray—See "Contracts Awarded."

Wis., Campbellsport—Feb. 10 (extended date) by Village, pumping equipment for waterworks and sewerage system. J. Donohue Eng. Co., Sheboygan, engrs. Noted Jan. 22, C.D.

CONTRACTS AWARDED

Calif., San Francisco—Public Utilities Comn., City Hall, laying 6 and 8 in. c.i. watermains in Balboa Park, involving 22,280 lin.ft. excav. and backfill, 17x36 in. trench, install fittings, make joints, replacement of pavements, etc., to Pacific States Constr. Co., Call Bldg., $17,970••• laying 6 and 8 in. c.i. watermains in area from 20th to 30th Aves., Lincoln Way to Rivera St., 23,190 lin.ft. excav. and backfill, 17x36 in. trench, install fittings, make joints, replace pavements, and laying 12 and 16 in. feeder mains in central section of city, etc., to Lowrie Paving Co., 1540 16th St., $16,990 and $58,375 respectively. Grand total $93,335. Bids Jan. 7, awarded Jan. 15. Noted Jan. 15, C. D.

Calif., San Francisco—Dpt. P. Wks., City Hall, constructing three 75,000 gal. rein.-con. fire cisterns for fire protection, to Sibley Grading & Teaming Co., 165 Landers St., $17,980. Bids Jan. 8, awarded Jan. 20. Noted Jan. 16, C.D.

Calif., Seal Beach—City Clerk, constructing water supply system, incl. 11,521 ft. 4- to 10-in. c.i. pipe, c.i. fittings, flanges, gate valves, wyes, reducers, etc., to H. A. Teget, 133 Princeton St., Ontario, $52,956. Est. $54,545. Bids Jan. 17, awarded Jan. 20. Noted Jan. 10, C. D. —Jan. 2, E. N.-R.

Ga., Ball Ground—City, drilling deep well for water supply, to Virginia Mach. & Well Co., 1319 East Main St., Richmond, Va., $1,610. Total est. $27,272. **P.W.A.** Noted July 20, C. D. —July 27, E. N.-R.

Ga., Bowden—City, c/o Mayor, City Hall, constructing waterworks, to Hornbuckle & Cole, Atlanta, $30,123. Est. $34,500. Bids Nov. 30. **P.W.A.** Awarded Jan. 13. Noted Nov. 29, C. D.

Ga., Thunderbolt — City, waterworks system, Contr. 3, to Chicago Bridge & Iron Wks., 37 West Van Buren St., Chicago, Ill., $6,380. Total est. $42,842. **P.W.A.** Noted Aug. 22, C. D.—Aug. 29, E. N.-R.

Ia., Storm Lake—City, pipe and fittings for waterworks, to McWane Cast Iron Pipe Co., 333 North Michigan Ave., Chicago, Ill.; hydrants, to Leighton Supply Co., Fort Dodge; valves, to Leighton Supply Co. and Crane & Co., Sioux City. Est. $15,000. Bids Jan. 13.

Mass., Braintree—Town, Bd. Selectmen, Town Hall, rebuilding dam at Great Pond, day labor. $25,000. Weston & Sampson, 14 Beacon St., Boston, engrs.

Mass., Harwich—Town, J. W. Crowell, chn. Bd. Selectmen, Town Hall, constructing dug wells, to C. Reppucci & Co., 10 Garden Court St., Boston, $6,350. **P.W.A.** Bids Jan. 13, awarded Jan. 20. Noted Jan. 20, C. D.—Jan. 9, E. N.-R.

Mass., Holyoke—City Water Power Co., 1 Canal St., furnishing, installing deaerating feed water heater, to Worthington Pump & Mchy. Corp., 10 High St., Boston. Noted Jan. 13, C. D.—Jan. 16, E. N.-R.

Mass., North Reading—Town, elevated steel storage tank, containing 140 tons steel, to Graver Tank & Mfg Co., 322 South Michigan Ave., Chicago, Ill. Noted Dec. 23, C. D.—Dec. 26, E. N.-R., under "Contracts Awarded."

Mass., Randolph—Town Hall, Contr. B, furnishing pumping equipment, to Turbine Equipment Co., 80 Federal St., Boston, $2,442. Noted Dec. 3, C. D.

Minn., Dover—Village, furnishing materials and erecting 50,000 gal. steel tank on 50 ft. tower, to Pittsburgh-Des Moines Steel Co., 1015 Tuttle St., Des Moines, Ia., $5,300. **P.W.A.** Bids Jan. 13. Noted Jan. 6, C. D.—Dec. 19, E. N.-R.

Mo., Oak Grove—City, 3 wells, brick house and pumps, to Britters Pump & Equipment Co., Pickwick Hotel, Kansas City. **P.W.A.** Noted Sept. 3, C. D.—Sept. 5, E. N.-R.

N. J., Bordentown—City, materials for water lines and fire protection lines at N. J. State Prison Farm, to U. S. Cast Pipe & Fdry. Co., Burlington, $2,307. Noted Dec. 18, C. D.

N. J., Keyport—Mayor and Council, installing watermains in Cliffwood and Oak Shade Sects., Matawan Twp., to A. S. Mundy & Co., Inc., 52 Main St., Woodbridge, $40,555.

N. C., Jackson—Town, E. B. Grant, mayor, drilling wells, to Layne Atlantic Co., Norfolk, Va., $2,500. **P.W.A.** Bids Dec. 6. Noted Nov. 29, C.D.

N. D., Bismarck—City, constructing 80 ft. diam. rein.-con. reservoir with Dorr clarifier and floceulator, to Haggart Constr. Co., 214 Roberts St., Fargo, $45,745. **P.W.A.** Bids Dec. 23. Noted Dec. 19, C. D.

O., Middletown—See "Bids Asked."

S. C., Columbia—City, coagulation basin, to Lee Constr. Co., 422 South Church St., Charlotte, N. C., $59,542. Est. $65,000. Bids Jan. 14. Noted Jan. 9, C.D.

Tex., Dickens—City, c/o Z. Fowler, mayor, waterworks, incl. waterwell, fire hydrants, meters, pumphouse, 4,800 ft. 6 in. and 8,600 ft. 4 in. c.i. pipe, one 40 g.p.m. at 175 IDN turbine well pump, one 15 ft. diam. x 60 ft. high steel standpipe, etc., to Winslow & Friday, Dallas, $22,174. Est. $23,000. **P.W.A.** Bids Nov. 25. Noted Dec. 12, C.D.—Nov. 21, E.N.-R.

Tex., Kingsville—City, c/o J. C. Nolan, mayor, constructing waterworks improvements, incl. concrete reservoir, pumping equipment and watermains, to Chamberlain & Strain, National Bank of Commerce Bldg., San Antonio, $28,073. Est. $31,000. Bids Dec. 7. Noted Dec. 18, C. D.—Oct. 17, E. N.-R.

Utah, American Fork — City, constructing 250,000 gal. concrete reservoir and 2 mi. c.i. pipe line, day labor. $20,000. **W.P.A.** E. B. Jones, Lehi, engr.

Utah, Murray—City, constructing 1 m.g. concrete reservoir, day labor. $26,997. **W.P.A.** H. Bletzacker, 50 East 5th St., Salt Lake City, engr.

Wis., Milwaukee—City, pumping equipment, to D. A. Washow, 2222 West State St., $1,923; acoustical work, to United Cask Co., 152 West Wisconsin Ave., $550. Bids Jan. 21.

SEWERAGE AND WASTE DISPOSAL

PROPOSED WORK

★ **Calif., Fresno**—City, completing surveys for 2 main sewer lines for outlying districts, pumping plants for Dry Creek section, 5 intercepting lines for business district. $525,000. Approved by W.P.A. for sewer works. J. L. Vincenz, City Hall, engr.

Calif., Sonora—City Council, rejected bids Nov. 22, constructing intercepting and outfall sewers and sewage treatment plant. Will readvertise. Noted Dec. 6, C. D.—Dec. 12, E. N.-R.

Calif., Sunset Beach—Sunset Beach Sanitary Dist. plans sanitary sewer collection system and disposal plant, incl. 31,500 ft. 4- to 8-in. vitr. clay pipe. $81,000. P.W.A. approved 45% grant. A. J. Smith, 810 Boylston St., Pasadena, consult. engr. Noted Apr. 26, C. D. —May 2, E. N.-R.

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†*Federal Government.*

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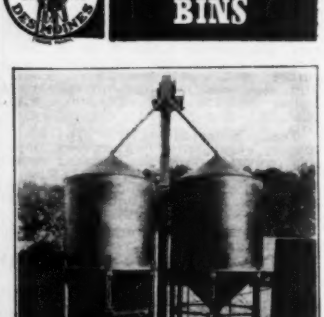

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Sewerage, etc. (Continued)

★ **Colo., Denver**—City plans nearing completion on building for sewage disposal plant. Total est. $2,750,000. Black & Veatch, 4706 Broadway, Kansas City, Mo., engrs. Noted Nov. 20, C. D.—Nov. 28, E. N.-R.

Conn., Bloomfield—Metropolitan Dist., Bureau P. Wks., 550 Main St., Hartford, plans Blue Hills Sewer Project, $235,327. P.W.A. project. Grant $108,000 acceptance, voted Jan. 15. R. N. Clark, Bureau P. Wks., Metropolitan Dist., Hartford, engr.

Conn., Norwich—State, preliminary plans sewage disposal plant for state Tuberculosis Sanatorium. $42,000.

Conn., Waterbury—City making plans 4,600 ft. sanitary sewer main. $54,239. R. Cairns, City Hall, engr.

Conn., Windsor—Metropolitan Dist., Bureau P. Wks., plans completed for Stoney Brook Sewer, providing for sewers in Park, Wilton and Laurel Aves. and Plymouth St., Harvey, Hillcrest and Ludlow Rds., and connecting trunk line. $30,000. P.W.A. grant of $13,500 accepted by Metropolitan Dist., $16,500 will be paid by Bureau. C. Saville, Main St., Hartford, engr.

Mass., Newton—City, E. O. Childs, mayor, City Hall, plans sewers. Bd. Aldermen appropriated $43,000 for same. C. A. Mahoney, street comr.

Minn., Minneapolis—City soon takes bids constructing interceptor sewer about Nicollet Island, Mississippi River and several syphon pipe lines from it across river to main disposal plant. $200,000. May apply for P.W.A. funds. F. T. Paul, city engr. R. Huston, in charge of sewer projects.

N. J., Manville — Town plans constructing storm sewers in North Second St. $25,113. W.P.A. project. J. F. Moroney, 2 Park Square, Morristown, W.P.A. engr.

N. J., Pleasantville—Mayor and Council plan approved and money allotted for sewage treatment and disposal. $135,000. Gondos & Gondos, Madison Hotel, Atlantic City, engrs.

N. Y., Falconer—Village voted $65,000 bonds toward constructing sanitary sewer project. $226,000. W.P.A. project. S. T. Benson, village engr.

N. Y., Ithaca—Dpt. Health, State Office Bldg., Albany, rejected bids Jan. 7, constructing sewer and water lines at Biggs Memorial Hospital. Noted Jan. 14, C. D.—Dec. 26, E. N.-R.

N. Y., Olean — City plans sewage disposal plant in western part of city, also incinerator. $175,000. Will apply for P.W.A. funds. G. Miles, city engr.

O., Berea—City completing plans Contr. 1, trunk sewer lines; Contr. 3, laboratory equipment and furniture; Contr. 4, landscaping of grounds for sewage disposal plant. P.W.A. project. R. F. MacDowell, 12th and Chester Bldg., engr.

O., Columbus—City rejected bids Jan. 7, for completion Olentangy Scioto Intercepting Sewer, Contr. 10, $65,044. Will be readvertised. Noted Jan. 17, C. D.—Jan. 23, E. N.-R.

Tex., Victoria—City, B. T. Jordan, mayor, plans sanitary sewer project, 10 in. concrete pipe. $26,000. W.P.A. project. E. F. Miles, Victoria, engr.

Wash., Tacoma—City plans sanitary and storm sewer in Division Ave. from Sprague to North 1st Sts., then on North G St. and Tacoma Ave. to North E St. to Stadium trunk sewer, $367,117; 24 in. storm sewer from Snake Lake to South Tacoma swamp, on South Tyler St., $73,295. W.P.A. project. C. Forsbeck, City Hall, engr.

Ont., Amherstburg — Municipality appoints Newman & Armstrong, engrs., Windsor, to prepare plans and estimates for sewer project.

★ **Ont., Toronto**—Municipality plans purchasing in connection with Ashbridge Bay Sewage Disposal Plant of blower and central heating plant $414,000, chlorination plant $133,000, miscellaneous equipment $49,000.

BIDS ASKED

Conn., Bridgeport—See "Contracts Awarded."

D. C., Wash.—Feb. 11, by District Comrs., District Bldg., miscellaneous piping, ducts, grading, paving for sewage treatment plant at Blue Plains, Va.

Mass., Somerville — Feb. 6, by City, J. E. Mullaney, city engr., City Hall, vitr. clay sewer lines in Broadway, Cross and Pearl Sts. To exceed $23,000. P.W.A. project.

N. J., New Providence—Feb. 19, by Mayor and Boro Council, for sewerage system, Contr. A, sewers and appurtenances, Contr. B, sewage treatment works and pumping station general construction: Contr. C, sewage treatment works and pumping station operating building superstructure: Contr. D, sewage treatment works and pumping station plumbing work, Contr. E, sewage treatment works and pumping station heating and ventilating. Noted Dec. 27, C.D.—Jan. 2, E.N.-R.

N. Y., Jamestown—See "Contracts Awarded."

N. Y., Middletown—Feb. 5, by Dpt. Mental Hygiene, T. F. Farrell, engr., State Office Bldg., Albany, sewers and water lines at Middletown State Hospital.

O., Greenville—Feb. 12, by Charles Kemble, Service Director, complete sewage treatment plant, $153,242. P.W.A. project. H. [illegible] Jones Co., National Bank Bldg., Toledo.

Va., Berryville—Feb. 6, at office of Clerk, constructing sanitary sewerage system. Bids Nov. 30 rejected. J. B. McCrary Co., Inc., Atlanta, Ga., engrs. Noted Nov. 22, C. D.

Wis., Oconomowoc—Feb. 8, by City, P. Behrend, clk., constructing sewage treatment plant, $109,000. P.W.A. project. J. Donohue Engr. Co., Sheboygan, engr. Noted Jan. 16, C. D.—Jan. 23, E. N.-R.

Que., Montreal—Feb. 5, by Executive Com., constructing sewer from intersection of Kelly St. and Henri Julian St. along Henri Julian, St. Denis, DeHertel and St. Hubert Sts. Montreal Sewers Comn., City Hall, engrs.

CONTRACTS AWARDED

Calif., Barstow—City Council, sewage treatment plant and collection system, involving lumber and millwork, miscellaneous iron work, painting, 6,032 ft. 10- to 15-in. vitr. clay pipe, c.i. piping, etc., to J. Grancich, 1117 North Gage St., Los Angeles, $83,251. Est. $30,000. P.W.A. Bids Jan. 16, awarded Jan. 16. Noted Jan. 13, C.D.—June 20, E.N.-R.

Calif., El Centro—City, outfall sanitary sewer and pumping plant, etc., to A. and B. Constr. Co., 912 Atlantic Blvd., Hynes, $249,297. Est. about $300,000. P.W.A. Bids Dec. 30. Noted Jan. 9, C.D.—Nov. 21, E.N.-R.

Calif., El Monte—City Council, sewage disposal plant involving millwork, roofing, plumbing, miscellaneous iron, painting, c.i. piping and valves (flanged and bell and spigot), vitr. pipe and drains, galvanized and black iron pipe, vent ducts, equipment, to G. E. Miller, 9401 Brighton Way, Beverly Hills, $51,000. Est. $50,000. P.W.A. Bids Jan. 13. Noted Jan 13, C. D.—Jan. 9, E. N.-R.

Calif., Santa Ana—Bd. Supervs. Orange Co. Flood Control Dist., constructing arch covered trapezoidal section drain, 4 ft. deep, 4 ft. bottom width, La Veta Ave. Storm Drain, to Macco Constr. Co., 815 Paramount Blvd., Clearwater, $26,000. Est. $25,000. Subject to P.W.A. approval. Bids Jan. 14. Noted Jan. 9, C. D.

Conn., Bridgeport — City, 168 ft. sanitary sewers in Seaview Ave., $1,256; 500 ft. De Kalb Ave., $2,467; 800 ft. storm sewers in East Main St., $11,559; storm sewers in Pennsylvania Ave., $4,699; Farmer Ave., $4,987; Beechmont Ave., Platt St., Wing St., $24,826; Pleasantview Ave., Peter St., $7,687. W.P.A. labor. Grand total $57,481. P. Brewster, dir. P. Wks.

Conn., Bridgeport — City, storm sewers in Golden Rod Ave., $11,367; sanitary sewers in Taft and McKinley Aves., $52,087; Wilmont Ave., Bay Union Ave., Reed, Beatrice, Currie, Housatonic Aves., $89,743. W.P.A. labor. Grand total $153,093. P. Brewster, Dir. P. Wks.

Conn, Milford—Town, Bd. Sewer Comrs., constructing trunk sewer, to O'Neil Bros., Inc., 22 Preston St., Hartford, $86,278. P.W.A. Bids Dec. 6. Noted Dec. 17, C. D.

Ga., Lumpkin—City, constructing sewers, to Hornbuckle & Cole, Atlanta, $29,937. Total est. $56,364. P.W.A. Awarded Jan. 12.

★ **Ill., Chicago**—Sanitary Dist. of Chicago, 910 South Michigan Ave., 13,350 lin.ft. concrete sewer for Upper Des Plaines Intercepting Sewer, Contr. 3, to McKay Engr. & Constr. Co., 228 North LaSalle St., $583,250 •••27,750 lin.ft. sewer, Contr. 5, to S. A. Healy Co., 600 West Van Buren St., $1,087,525•••10,850 lin.ft. concrete sewer, Contr. 6, to Underground Constr. Co., 130 North Wells St., $410,000. Grand total $2,080,755. P.W.A. Bids Dec. 5, awarded in December. Noted Dec. 2, C. D.

Ind., Bluffton—Bd. P. Wks. & Safety, new sewage disposal plant on Shafer farm at north edge of Bluffton, to J. A. Crosbie Co., Bluffton, $121,558. P.W.A. Bids Dec. 14. Noted Dec. 19, C. D.

Ia., Britt—City, constructing sewage disposal plant, to Lippert Bros., Boone, $42,800; drains, to Teget Constr. Co., Webster City, $68,675. Est. $115,000. P.W.A. Bids Jan. 6. Currie Eng. Co., Webster City, engrs.

Kan., Parsons — J. Reber, city engr., constructing complete sewage disposal plant, incl. building, sludge beds, pump house, to H. W. Underhill Constr. Co., Wichita, $68,899. Bids Jan. 13. Noted Jan. 10, C. D.—Jan. 16, E. N.-R.

Kan., Topeka — City, constructing East Side Sewage Plant, to G. Senne, 510 East 15th St., $254,380. P.W.A. Bids Jan. 14, awarded Jan. 14. Noted Jan. 10, C. D.—Jan. 16, E. N.-R.

Md., Crisfield—City, 17,700 lin.ft. 8- to 18-in. c.i. sewers, 6,000 lin.ft. 4-in. house connections, 60 manholes and appurtenances, to Burkett Constr. Co. Vineland, N. J., $73,840. Est. $75,000. P.W.A. Noted Jan. 8, C. D.

Mass., West Boylston—Worcester Co., H. H. Wheelock, chn. trustees, Worcester Co. Court House, Worcester, sanitary sewage disposal plant and clay pipe lines, to R. H. Newell Co., Uxbridge, $22,548 and $13,728, respectively. P.W.A. Bids Dec. 18., awarded Jan. 14. Noted Jan. 2, C. D.

Mich., Muskegon—City, intercepting sewers, mains and appurtenances, P.W.A. Docket 829, to Fry & Kain, Lansing, $266,284. P.W.A. Bids Dec. 23. Noted Dec. 16, C. D.

N. J., Jersey City—City, Dpt. Parks & P. Property, constructing 2,000 ft. 9 ft. precast

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†*Federal Government.*

Sewerage, etc. (Continued)

concrete sewer on wood piles in Danforth Ave. City furnish labor and equipment. W.P.A. furnish pipe. $350,000 plus. H. Clark, City Hall, engr.

N. Y., Jamestown — City, extending storm sewer connections in Jeffords, Kipp, Partridge, Dexter, Ivy and Dover Sts. $5,711; storm water sewer and catch basins in Market St. $3,093; storm water sewer and connections in Falconer St. $23,152, day labor. Grand total $31,956. W.P.A. project. L. L. Graham, city engr.

★**N. Y., New York**—Dpt. Sanitation, 125 Worth St., New York, constructing Bronx Intercepting Sewers from East 128th St. to Jerome Ave., Contr. 12, to Rodgers & Haggerty, Inc., 500 5th Ave. $1,451,620. Bids Jan. 6. P.W.A. General contractor sublet contract for 1,000 tons reinforcing steel to J. T. Ryerson & Son, Inc., 2558 West 16th St., Chicago, Ill. Noted Jan. 7, C. D.—Jan. 9, E. N-R.

★**N. Y., New York**—Dpt. Sanitation, Municipal Bldg., constructing superstructure for Wards Island Sewage Treatment Works, Contr. 1, to Underpinning & Foundation Co., 155 East 44th St., $1,219,703. Bids Dec. 23. Subject to P.W.A. approval. Contractor sublet contract for 1,100 tons reinforcing steel, to Bethlehem Steel Co., East 3rd St., Bethlehem, Pa. Noted Dec. 26, C. D.

N. Y., New York—Dpt. Sanitation, Municipal Bldg., alterations, repairs to stationary Excavator No. 2, Rikers Island, to Lambert National Division of McKiernan Terry Corp., 15 Park Row, $26,768. Bids Dec. 16.

O., Columbus—City, installing storm sewers, Part 3, Contr. 54, Bliss Run Dist., incl. 850 ft. 8- to 15-in. vitr. clay pipe, to Nick Cenci, 1381 Essex Ave., $58,084. Est. $60,000. P.W.A. Noted Jan. 17, C. D.—Jan. 23, E. N.-R.

Ore., Gresham — City, connection, pipe for sewerage system, to Parker Schram, Couch Bldg., Portland, $94,115; disposal plant, to Heber-Speldon, Tacoma, Wash., $21,368. Awarded Jan. 11. Noted Jan. 10, C. D.

Pa., Farrell—L. S. Newton, clk., sewers, raw sewage pumping station and sewage treatment plant, incl. control house, detritor, primary clarifiers, sludge digestion tank and glass covered sludge drying beds, to H. Platt Co., Erie, $96,371. Est. $100,000. P.W.A. Bids Jan. 14. Noted Jan. 9, C.D.

Pa., Scranton—City, to Sweeney Bros., 205 North Washington Ave., rebuilding North Main Ave. Sewer from Wood to Green Ridge St., $26,640; sewerage system in Fisk St., Adams Ave. and adjacent section, $20,890; pumping station in Driving Park Section, $11,589. Grand total $59,119. P.W.A. Maturity March 15. W. A. Schunk, dir. P. Wks., City Hall.

R. I., Providence — City, furnishing sludge pumps for sewage disposal plant, to Worthington Pump & Mchy. Corp., 89 Broad St., Boston, Mass., $9,200. P.W.A.

Tex., Austin—City, c/o J. G. Morgan, mgr., sewage disposal plant, to Brown & Root, Inc., 706 Colorado St., Austin, $380,790. Est. $390,000. P.W.A. Bids Nov. 20. Noted Dec. 2, C. D.—Sept. 26, E. N.-R.

BRIDGES AND GRADE CROSSINGS

PROPOSED WORK

★**Ind., Muncie**—Delaware Co. making plans constructing seven concrete bridges over White River, six here to be built on East and West Jackson St., Bway., Hizh, North Walnut and Elm Sts., and 1 in Eaton, $90,000 each. Total $630,000. Applied for $283,000 P.W.A. funds.

Iowa—State Hy. Comn., Ames, constructing 1 multiple span overhead crossing, incl. one 56x24 ft. and two 43x24 ft. cantilever I-beam spans, 3 rein.-con. pipe culverts, incl. 295 cu. yd. Class 1 excav. over C. & N. W. Ry. on U. S. Rd. 30, in Scranton, Greene Co. F. R. White, ch. engr.

Iowa—State Hy. Comn., Ames, soon takes bids 17 rein.-con. pipe and 2 rein.-con. box culverts on Secondary Road between Eddyville and Ottumwa, Wapello Co., incl. 1,150 cu.yd. Class 1 excav.; 12 rein.-con. box and 6 rein.-con. pipe culverts on Secondary Road between Eddyville and Ottumwa, Wapello Co., 1,015 cu.yd. Class 1 excav.; 1 rein.-con. pipe, 1 rein.-con. arch, and one 74 ft. thru girder underpass crossing structure, on U. S. Rd. 88, west of Melbourne, Marshall Co., 820 cu.yd. Class 1 excav., 1,900 cu.yd. backfill; 500 ft. deck plate girder bridge, one 5x5 ft. rein.-con. box culvert on 2nd St., Des Moines, Polk Co., 355 cu.yd. Class 1 and 1,195 cu.yd. Class 2 excav.; one 120x120 ft. continuous I-beam bridge, 410 cu.yd. Class 1 and 90 cu.yd. Class 2 excav.; three 28x20 ft. I-beam span bridges, 90 cu.yd. Class 1 and 1,120 cu.yd. Class 2 excav.; one 24x20 ft. I-beam bridge, 22 cu.yd. Class 1 and 90 cu.yd. channel excav., all on Secondary Road north of Randolph, Fremont and Mills Counties. F. R. White, state hy. engr.

Kan., Manhattan — Chicago, Rock Island & Pacific R.R., La Salle St. Station, Chicago, Ill., plans bridge. $25,000. Private plans.

Maine — State Hy. Comn., Augusta, plans overpass bridge to eliminate grade crossing at Bradgon's Crossing, in Wells. To exceed $23,000. L. D. Barrows, ch. engr.

Massachusetts—Town of Greenfield, H. M. Loomis, clk. Bd. Selectmen and Town of Montague Bd. of Selectmen and County Commissioners voted to petition Massachusetts State Legislature for bill to authorize construction of bridge over Connecticut River between Turners Falls and Gill, without cost to towns or county. To exceed $25,000.

★**Minn., Minneapolis**—City plans constructing bridges over Mississippi River, one at Lake St., and one at 38th St. $1,500,000 each. F. T. Paul, city engr.

★**Mo., Kansas City**—City plans steel, rein.-con. viaduct across 23rd St. $1,200,000. Plans approved by State Hy. Dpt. Black & Veatch, 4706 Broadway, Kansas City, engrs. Noted Sept. 3, C. D.—Sept. 5, E. N.-R.

New York—Dpt. P. Wks., Albany, bids in spring, constructing structural steel bridge over Pennsylvania R. R. Co. tracks, on State Hy. 1829, $211,000; soon takes bids bridges at Fraser, at West Delhi, on Treadwell Rd., on Elk Creek Rd., on Delhi-Leonta Rd., 2 timber trestles on Delhi-Leonta Rd., and culverts on Holmes Hollow Rd. and on Southerland Rd., $25,000*** bids in spring bridge on Hy. 5565, near Chenango Forks, $181,000.

N. Y., Central Bridge—Delaware & Hudson R.R. Co., J. MacMartin, ch. engr., Albany, bids in spring eliminating Becker and Bunker Crossings. To exceed $22,000.

N. Y., Gates—New York Central R.R. Co., J. W. Pfau, ch. engr., 466 Lexington Ave., New York, bids late in February or early in March, eliminating grade crossing at Howard Rd. $140,000.

N. Y., Hoosick—Boston & Maine R. R. Co., W. J. Backes, ch. engr., Boston, Mass., soon takes bids eliminating Pease Street Crossing, Old Northern Turnpike. $95,000.

★**N. Y., Syracuse**—State Dpt. P. Wks., State Office Bldg., Albany, bids in spring, 1,400 underpass at Geddes St., under New York Central and Delaware, Lackawanna and Western R.R. tracks. $500,000. Test borings now being made. T. F. Farrell, Albany, engr.

North Carolina — State Hy. & Pub. Wks., Raleigh, plans 2 overhead bridges to replace existing timber structures, 1 over Southern R.R. at Dover Mills, other over Seaboard Air Line R.R., west of Shelby. Est. about $30,000. W. L. Craven, bridge engr.

Texas — State Hy. Comn., H. Hines, chn., Austin, plans nearing completion widening I. and G. N. R.R. underpass and approaches, Hy. 2, WPGH 273-B, Part 2, Frio Co. New P.W.A. project.

★**Texas**—State Hy. Comn., H. Hines, chn., Austin, making plans steel, concrete T. and P. R.R. underpass, Hy. 66, W.P.G.H. 825, Palo Pinto Co., $60,000; G. C. and S. F. R.R. overpass, etc., Hy. 67, W.P.G.H. 48, Bosque Co., $50,000; T. and P. R.R. underpass, etc., Hy. 8, W.P.C.M. 192, Harrison Co., $69,000; T. and N. O. Railway underpass, Hy. 40, W.P.G.H. 136-Y, Kaufman Co., $58,000; underpass beneath the tracks of the B. & R. I. and S. L. B. M. and G. C. and S. Fe and B. S. L. and W. W. R.R. on Polk St., W.P.G.M. 851-A, Houston, Harris Co., $110,000; T. and N. O. R.R. underpass, etc., Hy. 29, W.P.G.M. 743-A and B, Goliad Co., $90,000; G. C. and S. Fe R.R. overpass, approaches, etc., Alvin, Hy. 38, W.P.C.M. 637-C, Brazoria Co., $85,000; T. and N. O. R.R. underpass and concrete paving Hy. 20, W.P.G.H. 236-C, Washington Co., $90,000. New P.W.A. project.

Wash., Everett—City plans constructing creosoted piling, concrete decked structure, at Norton and 22nd Sts. Present overhead must be repaired, replaced or closed. $60,000. G. G. Paine, City Hall, engr. Noted Jan. 30, C. D.—Feb. 7, E. N.-R.

★**Wash., Tacoma**—Pierce Co. plans 5,000 ft. suspension bridge over Puget Sound Narrows. Est. about $5,000,000. Applied for P.W.A. Moran & Proctor, 120 East 41st St., New York, engrs.

Canada—Dpt. Rys. & Canals, Ottawa, Ont., Col. A. E. Dubuc, plans undercrossing Canada Pacific Rys. at mileage 57-0-Crows Nest Subdivision, Monsell, Alta., $21,000; overhead crossing C. R. Ry., mileage 72-8 Crows Nest Subdivision near Sundbreck, Alta., $25,000; subway under railway tracks, west of existing grade level crossing at St. Georges Rd., Grand Mere, Que., also highway diversion, est. $65,000.

Ont., Lucknow—Municipality plans concrete, steel bridge. Engineer not appointed.

Que., Grand Mere—Municipality and Canadian National R. R. plan constructing subway at St. Georges Rd. $69,000. **Maturity in spring.**

BIDS ASKED

Calif., Ventura — Feb. 7, by Bd. Superv., constructing 2,100 ft. timber bridge over Beach Rd. and Santa Clara River, incl. 500 tons structural steel, 12,000 wood piling, 498,000 bd. ft. redwood timber, $23,000. P.W.A. project. R. L. Ryan, Court House, engr. Noted Sept. 24, C. D.—Oct. 3, E. N.-R.

New Hampshire—Feb. 6, by State Hy. Dpt., Concord, 37 ft. stone faced rein.-con. frame bridge over railroad. $75,000. J. W. Childs, Concord, engr.

†*Federal Government.*

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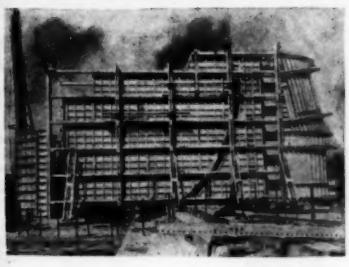
BLAW-KNOX

Construction Equipment



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Bridges, etc. (Continued)

New York—See "Streets and Roads."

New York—Feb. 11, by Triborough Bridge Authority, 111 8th Ave., New York, paving and completing anchorages of East River crossing of Triborough Bridge, connecting Manhattan, Queens and Bronx Boros, Contr. 60.

New York—Feb. 13, by Triborough Bridge Authority, 111 8th Ave., New York, buildings and toll plazas for Triborough Bridge connecting Manhattan, Bronx and Queens Boros, Contr. 59.

New York—Feb. 18, by Triborough Bridge Authority, 111 8th Ave., New York, paving Ward's and Randalls Island viaducts of Triborough Bridge, connecting Manhattan, Bronx and Queens Boros, Contr. 61.

N. Y., New York—Feb. 7, by Transit Comn., 270 Madison Ave., reconstructing bridge carrying West 184th St. (West Fordham Rd.) over Main Line and Putnam Div. tracks of New York Central R.R., University Heights Station, Bronx Boro. Noted Jan. 20, C. D.—Jan. 23, E. N.-R.

N. Y., Jamestown—Feb. 21, by Erie R. R. Co., G. S. Fanning, ch. engr., Midland Bldg., Cleveland, O., eliminating Fairmount Ave. grade crossing. $230,000. Noted Nov. 14. C.D.—Nov. 21, E.N.-R.

Rhode Island—Feb. 3, by State and Providence Plantations Division of Contracts, Standards & Purchases, Smith St., State House, Providence, Bridge 365 and approaches, Bradford R. R. bridge, Project W-49-E, single span, deck girder span of steel, rein.-con., Westerly, etc.; Bridge 370 and approaches, Wickford Hill railroad bridge, WPGS 118, North Kingstown. To exceed $150,000.

South Carolina—Feb. 4, by State Hy. Dpt., Columbia, 117 ft. rein.-con. bridge over S. A. L. R. R. and 0.336 mi. plain concrete approaches, Project W.P.G.H. 66, Sect. 1, Richland Co., 41,000 cu.yd. excav., $46,500; 197 ft. rein.-con. bridge over S. A. L. R. R. and 0.379 mi. plain concrete approaches, Project W.P.G.H. 66, Sect. 2, Richland Co., 9,600 cu.yd. excav., $37,600; 194 ft. rein.-con. bridge over Southern R. R., 0.067 mi. concrete approaches, Project W.P.G.H. 20-A, 1,484 cu.yd. excav., $23,400; 120 ft. rein.-con. bridge over A. C. L. R. R. on Route 61, W.P.G.S. 404, Charlestown Co., $12,000; 170 ft. rein.-con. bridge over S. A. L. R.R., Route 501, W.P.G.H. 6-B., Marion Co., $19,000; 138 ft. rein.-con. bridge over A. C. L. R. R., Route 64, W.P.G.S. 382-D, Berkeley Co., $13,800; 140 ft. rein.-con. bridge over A. C. L. R. R. on Route 171, at Salters, W.P.G.H. 401-B, Williamsburg Co., $15,100.

Utah—State Rd. Comn., Salt Lake City, constructing 2 underpasses in Utah Co., to Christensen & Gardner, Interburban Depot Bldg., Salt Lake City, $117,450. Est. $121,534. Bids Jan. 17. Noted Jan. 8, C. D.

CONTRACTS AWARDED

Alabama—State Hy. Dpt., Montgomery, steel, concrete bridge over Central of Georgia tracks, Opelika, Lee Co., to Couch Constr. Co., Dothan, $139,883. Bids Oct. 25. Noted Oct. 30, C. D.

Alabama—See "Streets and Roads."

★ **California**—State Hy. Comn., at office of C. H. Purcell, state hy. engr., Los Angeles, constructing overhead crossing over tracks of Southern Pacific R. R. and Los Angeles R. R. at Figueroa St., Los Angeles, to Clinton Constr. Co., 541 South Spring St., Los Angeles, $578,420 est. $898,235•••undergrade crossing under tracks of Union Pacific R. R. over Valley Blvd. and S. P. R. R. at Soto St., Los Angeles, to Griffith Co., 1060 South Broadway, Los Angeles, $116,865 est. $233,100•••overhead crossing over Valley Blvd., and tracks of Southern Pacific R. R., Soto St., Los Angeles, to O. Oberg, 150 North Vista St., Los Angeles, $154,943 est. $257,219•••undergrade crossing under tracks of Pacific Electric Railway, Mission Rd., Los Angeles, Los Angeles Co., to L. E. Dixon Co., 609 South Grand Ave., Los Angeles, $241,665 est. $381,411. Grand total $1,091,893. Bids Dec. 19, awarded Jan. 14. Noted Jan. 3, C. D.

California—Barrett & Hilp, general contractors, 918 Harrison St., San Francisco, painting traffic distribution structures, San Francisco-Oakland Bay Bridge, Alameda Co., to D. Zelinsky & Sons, Inc., 165 Grove St., for State Toll Bridge Authority, 500 Sansome St., San Francisco.

Connecticut—State Dpt. Hys., J. A. Macdonald, comr., Hartford, reconstructing Straus bascule lift bridge Pequannock River, Grand St., Bridgeport, to C. W. Blakeslee & Son, 58 Waverly St., New Haven, $64,910•••bridge over Rappawan River, and bridge on Long Ridge Rd., both Stamford, to P. Bacco, 1 Atlantic St., Stamford, $57,732 and $31,432 respectively. Grand total $154,095. P.W.A. Bids Jan. 13. Noted Jan. 15, C. D.

Indiana — State Hy. Comn., Indianapolis, bridges over Nickel Plate Ry., north of Silver Lake, Kosciusko Co., to Phend & Brown, Milford, $75,893 est. $90,257•••over River De Shis, southeast of Vincennes and over Curtis Creek and Saylor Ditch, west of Rensselaer, to Vincennes Steel Corp., Terre Haute Rd., Vincennes, $47,332 and $13,904 respectively, est. $49,781 and $14,785 respectively. Grand total $137,120. Bids Dec. 10. Noted Nov. 27, C. D. —Dec. 5, E. N.-R.

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Iowa — State Hy. Comn., Ames, 15 corrugated metal pipe and 6 concrete culverts in Clarke Co., and I-beam overpass structure in Humboldt Co., to Snyder & Johnson, Humboldt, $7,686 and $12,804 respectively•••I-beam bridge in Dubuque Co., to J. H. Hennessinger & Co., Davenport, $24,977•••2 pipe and 2 concrete box culverts, in Franklin Co., to Hildebrand & Kragh, Belmond, $669•••4 pipe and 6 concrete box culverts in Johnson Co., to Waugh & Tackman, Clarksville, $7,646•••multiple span overpass structure in Ringgold Co., to Dufall & McKinney, Logan, $13,074•••concrete arch culvert in Ringgold Co., to C. W. Boltz, Indianola, $4,457. Grand total $71,313.

Iowa — State Hy. Comn., Ames, 1 multiple span bridge in Cass Co., and 1 cantilever bridge in Crawford Co., to V. L. Lundeen, Montezuma, $20,446 and $13,008 respectively•••6 concrete pipe and 6 concrete box culverts in Cherokee Co., and 9 pipe and 9 box culverts in Cherokee and Buena Vista Counties, to H. Noel, Peterson, $4,481 and $11,041 respectively•••3 concrete pipe and 3 concrete box culverts in Delaware Co., to T. Fisko, Garber, $3,419•••2 concrete pipe and 6 concrete box culverts in Fremont and Mills Counties, to Schroyer Constr. Co., Baxter, $4,413. Grand total $56,808. Bids Dec. 10, awarded Jan. 17.

Maine—State Hy. Comn., Augusta, rein.-con. bridge over Maine Central R. R. tracks, Freeport, to John H. Simonds Co., 216 A Federal St., Portland, $48,277. Bids Jan. 14, awarded Jan. 20. Noted Jan. 10, C. D.

★ **Michigan** — State Hy. Comn., Lansing, 2 grade separation structures, etc., WPGM-X1 of 82-9-41C-1, Wayne Co., to W. E. Lennane, 8717 Arcadia St., Detroit, $546,860••• bridge, WPGH-X1 of 63-8-30C-1, Oakland Co., and grade separation, WPGH-X1 of 73-7-2C-1 and WPGM-X1 of 73-7-2C-2 and WPGH 73-38C-1 and WPGM 73-38C-2, Saginaw, to Jutton-Kelly Co., 640 New Center Bldg., Detroit, $73,732 and $221,322 respectively•••WPGM-X1 of 82-22-9C-1 and WPGM 82-44C-1, Wayne Co., bridge having 2 rein.-con. type abutments, etc., to W. J. Storen Co., 2411 14th St., Detroit, $348,073. Grand total $1,189,987. Noted Dec. 23, C. D.

New York—A. W. Brandt, comr. Hys., Albany, constructing bridges in Monroe Co., to I. M. Ludingston Sons, Inc., 317 Genesee Valley Trust Bldg., Rochester, $222,780; general contractor awarded structural steel for same project, to McClintic-Marshall Corp., Bell and Abbey Sts., Buffalo•••reinforcing steel, to Genesee Bridge Co., West Ave., Rochester••• J. Bellardino, general contractor, Seneca Falls, reinforcing steel for bridge in Seneca Co., to American Steel & Wire Co., Heffernan Bldg., Syracuse•••D. W. Winkelman Co., general contractors, Heffernan Bldg., Syracuse, reinforcing steel for trestle and rein.-con. box culverts in Tompkins Co., and reinforcing steel for bridge, Seneca Co., to American Steel & Wire Co., Heffernan Bldg., Syracuse. Noted Jan. 16, C.D. —Dec. 19, E. N.-R.

New York—A. M. Hazell, Inc., general contractors, 117 Liberty St., New York, 250 tons reinforcing steel for bulkhead walls along East River Dr., for Triborough Bridge Authority, 111 8th Ave., New York, to J. T. Ryerson & Son, Inc., 135 South LaSalle St., Chicago, Ill. Noted Dec. 23, C. D.—Dec. 26, E. N.-R., under "Contracts Awarded."

N. Y., New York—P. T. Cox Contg. Co., general contractors, 154 Nassau St., 550 tons structural steel for Hendrick Hudson Parkway, for Hendrick Hudson Parkway Authority, Arsenal Bldg., Central Park, New York, to Fort Pitt Bridge Wks., Oliver Bldg., Pittsburgh, Pa.; 225 tons reinforcing steel for bridge connecting Dyckman St. and Riverside Dr., same project, to Bethlehem Steel Co., Bethlehem, Pa. Noted Jan. 20, C. D.—Jan. 23, E. N.-R., under "Contracts Awarded."

New York—H. J. Suits, general contractor, Watkins Glen, reinforcing steel for bridge near Hector, Schuyler Co., to Kalman Steel Co., Bethlehem, Pa., for Dpt. Hys., Albany. Noted Nov. 19, C. D.—Dec. 5, E. N.-R., under "Contracts Awarded."

N. Y., Schenectady—New York Central R. R. Co., J. W. Pfau, ch. engr., 466 Lexington Ave., New York, eliminating Carman Street Grade Crossing, to Foley Bros. Corp., 135 East 42nd St., New York. Est. $304,100. Bids Jan. 13. Noted Jan. 20, C. D.—Jan. 9, E. N.-R.

Pennsylvania—See "Streets and Roads."

Pennsylvania—P. M. Tebbs, for W. Van Dyke, secy. Hys., Harrisburg, 17 ft. rein.-con. bridge, native stone approach, Route 49054, East Chillisquaque Twp., Northumberland Co., to Thos. B. Evans, 344 Ferry St., Danville, $2,400; 18 ft. rein.-con. and cement rubble masonry bridge, native stone base, 14 ft. 8 in. wide and approaches, Route 56026, Colley Twp., Sullivan Co., to R. Rosser, 55 South Washington St., Wilkes-Barre, $2,130•••200 ft., rein.-con. and cement rubble masonry bridge, native stone base widening Route 58053, Union Twp., Tioga Co., to Webb S. Rice, Mansfield, $3,730•••44 ft. rein.-con. bridges, native stone base, 14 ft. 8 in. wide on approaches, Route 19019, Sect. 1, Locust Twp., Columbia Co., to G. L. Bittenbender, Berwick, $2,522•••150 ft., rein.-con. and cement rubble masonry bridge, native stone base, 16 ft. 8 in. and 18 ft. 8 in. wide, Route 19051, Madison Twp., Columbia Co., to P. M. Greenly, Berwick, $2,951. Grand total $137,733. Bids Jan. 3. Noted Jan. 10, C. D., under "Streets and Roads, Low Bidders."

†*Federal Government.*

Bridges, etc. (Continued)

Pennsylvania—P. M. Tebbs, for W. Van Dyke, secy. Hys., Harrisburg, 0.53 mi. through truss bridge, bituminous on native stone surfacing, rein.-con. bridge, Route 292, Sect. 1, Westfield Twp., Tioga Co., to Graham Constr. Co., P. O. Box 31, Lancaster, $55,028. Bids Jan. 10. Noted Jan. 15, C. D., under "Streets and Roads."

South Carolina—State Hy. Dpt., Columbia, constructing 100 ft. rein.-con. bridge over Southern R. R. and asphalt paving U. S. Route 21 and State Route 5, Rock Hill W.P.G.M. 4, York Co., to B. H. Martin, Easley, $27,239 ***constructing 111 ft. rein.-con., structural steel bridge and plain concrete approaches over S. A. L. R. R., on Route 9, west of and near Chester, W.P.G.H. 364, Chester Co., to Rickenbacker Constr. Co., Union, $38,984. Bids Nov. 12. Noted Nov. 20, C. D.—Nov. 7, E. N.-R., under "Streets and Roads."

South Carolina—State Hy. Dpt., Columbia, constructing 166 ft. rein.-con. bridge over A. C. L. R. R., on U. S. Route 52, W.P.G.H. 218, Berkeley Co., to C. Y. Thomason, Greenwood, $19,978***99 ft. rein.-con. bridge over S. A. L. R. R., on U. S. Route 76, W.P.G. 45-D, Richland Co., to J. W. Barnwell, Jr., Columbia, $14,629***196 ft. rein.-con. bridge over S. A. L. R. R., on U. S. Route 1, W.P.G.H. 46, near Camden, Kershaw Co., to Pennell & Harley, Inc., Spartanburg, $19,360***156 ft. rein.-con. bridge over A. C. L. R. R., on U. S. Routes 17 and 33, W.P.G.H. and M. 346-C, at Hardeeville, Beaufort and Jasper Counties, to Wannamaker & Wells, Inc., Orangeburg, $20,017. Grand total $73,984. Bids Nov. 5, awarded Jan. 15. Noted Nov. 14, C. D., under "Bridges and Grade Crossings"—Oct. 31, E. N.-R., under "Streets and Roads."

Texas—G. Gilchrist, state hy. engr., Austin, constructing Llano River Bridge, Hy. 9, F.R.P. 2, Sect. 3-H-C, Contr. 71-4-15, Mason Co., to Froemming Bros., 3901 Miramar Ave., Dallas, $95,419 est. $100,000; replacement of east end of Nueces River Bridge, Hy. 3, E.R.P. 3, Sect. 3H-C, Uvalde Co., to Brown & Root, Inc., 706 Colorado St., Austin, $66,546 est. $70,000. New P.W.A. Bids Dec. 31. Noted Jan. 13, C. D.

Vermont—State Hy. Dpt., Montpelier, H. E. Sargent, ch. engr., Montpelier, steel plate girder bridge with concrete approach slabs over South Branch of Walloomsac River, on North St., Bennington, to T. J. Harvey & Son, East Rd., Adams, Mass., $23,062. Bids Jan. 3, awarded Jan. 21. Noted Jan. 13, C. D.

Washington—See "Streets and Roads."

Wisconsin—See "Streets and Roads."

Ont., London—City, constructing 1 span 160 ft., concrete, steel bridge over Thames River on York St., city forces; structural steel, to London Structural Steel Co. Ltd., Burslem St. Est. $61,000. W. M. Veitch, P. Utilities Bldg., city engr. Noted Nov. 12, C. D.—Nov. 14, E. N.-R.

STREETS AND ROADS

BIDS ASKED

Arizona—Feb. 11, by State Hy. Comn., Phoenix, grading, draining, road dust pallaitive on Flagstaff-Fredonia Hy. W.P.H. 95-J, incl. 29,200 cu.yd. roadway excav., 3,100 cu.yd. drainage and 800 cu.yd. structural excav. T. S. O'Connell, state hy. engr.

California—Feb. 13, by State Hy. Comn., P. Wks. Bldg., Sacramento, grading 14.5 mi. hy. between Longvale and Dos Rios, Mendocino Co.; grading, asphaltic concrete paving 2.4 mi. hy. between Richfield Tower and Santa Maria River, Santa Barbara and San Luis Obispo Co.; grading, concrete paving 3.1 mi. hy. between Tajiguas Creek and Arroyo Hondo, Santa Barbara Co. C. H. Purcell, P. Wks. Bldg., Sacramento, engr.

Calif., Los Angeles—Feb. 10, by Bd. Supervs. Los Angeles Co., grading, asphaltic concrete paving 0.77 mi. Cedar Ave., north line of Tract 9901 to 190th St., Torrance. To exceed $23,000. G. W. Jones, Hall of Records, engr.

Connecticut—See "Contracts Awarded."

Conn., Bridgeport—See "Contracts Awarded."

Conn., Danbury—See "Contracts Awarded."

Iowa—Feb. 4, by State Hy. Comn., Ames, grading 9.374 mi. secondary road between Eddyville and Ottumwa, Wapello Co., incl. 288,111 cu.yd. excav.; 3.865 mi. secondary road between Eddyville and Ottumwa, Wapello Co., incl. 137,491 cu.yd. excav.; 0.321 mi. approach fills for C. & N. Ry. crossing, Greene Co., incl. 76,299 cu.yd. excav. F. R. White, ch. engr.

Louisiana—Feb. 5, by State Hy. Comn., Baton Rouge, concrete paving 0.455 mi. Route 9, U. S. P. Wks. Hy. Project NRM 189-C, State Project 2551-B, Mansfield-East Hy., De Soto Parish.

Md., Baltimore—Jan. 29, by Bd. Awards, furnishing, delivering paving blocks during 1936.

Missouri—Feb. 7, by State Hy. Dpt., Jefferson City, graveling 1.076 mi. Route 79TR-1D, Louisiana South; 11.551 mi. Route 8D, Sects. 1A, 2B and 3A, Eolia to Louisiana, Pike Co.; 10.647 mi. Route 41, Sects. 10B, 11B, 12B and 13B, Route 40 to Saline Co., Cooper Co.; 7.694 mi. Route 28, Sects. 8B and 9B, Vienne Southwest, Maries Co.; 17.986 mi. Route 160, Sects. 7A, 8A, 9A, 10A, 11A and 12A, Barton Co.; 5.669 mi. Route 60, Sect. 60C, Winona to Fremont Rd., Shannon Co.

Nevada—State Hy. Comn., Carson City, soon takes bids constructing 12.6 mi. unit Federal Lands Hy., Route 4, Sect. A1, from point 3 mi. east of Tonopah to West Forest, Nye Co.; and 0.98 mi. road in Elko, Elko Co. R. A. Allen, Heroes Memorial Bldg., Carson City, engr.

New Hampshire—Feb. 6, by State Hy. Dpt., Concord, 4 in. on 5 in. gravel surfacing 1.998 mi. Northfield Rd., Winchester, Cheshire Co., incl. 37,867 cu.yd. earth and 2,851 cu.yd. ledge rock excav. $120,000. C. P. Riford, Concord, engr.

New York—Feb. 11, by A. W. Brandt, comr. Hys., Albany, concrete paving and raising and reflooring 181 ft. truss bridge, Oneida Co.; bituminous macadam paving 2.64 mi. Onondaga Co.; roadside improvements in Onondaga Co.; constructing brick elimination structure, incl. 140 ft. truss bridge and 0.28 mi. I-beam approaches, Chautauqua Co.; 34 and 45 ft. timber trestles and 16, 15 and 21 ft. slab bridges in Delaware Co.; 113 ft. truss bridge and concrete and bituminous macadam paving 0.13 mi, Monroe Co.; 104 ft. plate girder and two 49 ft. I-beam approach spans over Pennsylvania R.R., Chemung Co.; 30, 32 and 50 ft. I-beam bridges and bituminous macadam paving 1.37 mi. in Chenango Co.; 30 ft. I-beam bridge and 0.21 mi. approaches Steuben Co.; 50 ft. I-beam and 60 ft. girder bridge, Tioga Co.

Pennsylvania—P. M. Tebbs, for W. Van Dyke, secy. Hys., Harrisburg, rejected bids Dec. 20, for grading, drainage, 2 rein.-con. structures 1.23 mi. Route 68, Burrell Twp., Indiana Co.; bituminous on native stone base surfacing 0.64 mi. Route 177, Sect. 1, Fairmount Twp., Luzerne Co.; bituminous surfacing, etc., 4.75 mi. Route 161, Sects. 2 and 3, Upper Augusta, Shamokin, Ralpho and Coal Twps., Northumberland Co.; bituminous surfacing, etc., 0.35 mi. Route 49040 Upper Augusta Twp. and city of Sunbury, Northumberland Co.; bituminous on native stone surfacing 1.02 mi. Route 26, Sect. 1, Franklin Twp., Snyder Co. Noted Jan. 2, C. D.

South Carolina—Feb. 4, by State Hy. Dpt., Columbia, earth type surfacing 3.415 mi. Route 261, W.P.S.S. 434, Williamsburg Co., involving 55,400 cu.yd. excav. and surfacing, $35,600; 4.887 mi. Route 39, W.P.S.S. 377-C, Laurens Co., 54,500 cu.yd. excav. and surfacing, $33,900; 5.277 mi. Route 33, W.P.H. 40, Sect. 2, Allendale Co., 64,300 cu.yd. excav. and surfacing, $35,600; 5.69 mi. Route 341, W.P.M.S. 425 and W.P.S.S. 425, Lee Co., 41,200 cu.yd. excav. and surfacing $36,400; earth grading, drainage structures 7.266 mi. Route 15, W.P.H. 359-E, Sumter Co., 19,700 cu.yd. excav., $16,300; earth type surfacing 5.744 mi. Route 38, W.P.H. 355-C, Marlboro Co., 59,700 cu.yd. excav. and surfacing, $37,200; bituminous surfacing 0.502 mi. U. S. Route 501, approaches to bridge over S. A. L. Railroad, W.P.G.H. 6-B, and State Project 6-B, reopened, Marion Co., 53,000 cu.yd. excav., $25,500; earth type surfacing 0.4 mi. Route 64, approaches to bridge over A. C. L. R. R., Project W.P.G.S. 382-D, Berkeley Co., 56,600 cu.yd. excav. and surfacing, $20,000; earth type surfacing 0.545 mi. Route 171, W.P.G.H. 401-B, Williamsburg Co., 78,000 cu.yd. excav. and surfacing, $31,400; bituminous surfacing 3.541 mi. hy. and constructing 76 ft. treated timber, concrete, steel bridge over Lake Swamp, Route 763, Project W.P.S.S. 371-C, Darlington Co., 47,800 cu.yd. excav., $44,200.

Wisconsin—Feb. 4, by State Hy. Comn., Madison, grading, concrete paving 95.074 cu.yd. Milwaukee-Chicago Rd., Thompsonville South County Line, Racine Co., incl. 3,749 cu.yd. common excav. Bids Jan. 17 rejected. Noted Jan. 22, C.D.

CONTRACTS AWARDED

Alabama — State Hy. Comn., Montgomery, rein.-con. paving 7.862 mi. Huntsville, Rd.-Tennessee Line Rd., WPH 242-C, Madison Co., to H. E. Wolfe, St. Augustine, Fla., $209,768 ***steel and concrete underpass and asphalt paving 0.15 mi. North 15th Ave., Birmingham, WPGM 383, Jefferson Co., to Southern Constr. Co., Cherokee Rd., Birmingham, $128,163*** steel, concrete overhead bridge, on 0.02 mi. Decatur-Athens Rd., WPGH 157-B, Limestone Co., to Walters & Grant, Troy, $15,375. Grand total $353,306. Bids Dec. 4, 13 and 26th. Noted Nov. 29, Dec. 19 and Dec. 27, C. D.

Alabama—State Hy. Comn., c/o G. Scott, pres., Montgomery, grading, draining 4.96 mi. Faunsdale-Dayton Rd., WPSO 332-B, Marengo Co., to Vandigriff Constr. Co., Montgomery, $59,352. Bids Dec. 20. Noted Dec. 27, C. D.

Calif., San Jose — J. J. Lynch, city clk., asphaltic concrete surfacing South Market and South 1st Sts., to Union Paving Co., Call Bldg., San Francisco, $27,910. Est. $27,850. Noted Jan. 7, C. D.—Jan. 2, E. N.-R.

Calif., San Francisco—Dpt. P. Wks., City Hall, widening asphaltic concrete paving 5th St. between Harrison and Mission Sts, etc., to Fay Impvt. Co. Phelan Bldg., San Francisco, $43,570. Bids Jan. 10, awarded Jan. 16. Noted Jan. 21, C. D.—Jan. 23, E. N.-R.

Connecticut—State Hy. Comn., J. A. Macdonald, state hy. comr., Hartford, improving 10 mi. Farm-to-Market Roads, Darien, $19,374; 15 mi. same roads, Greenwich, $13,913; sidewalks and curbing, 7,200 ft. hys. Westport,

(Federal Government.

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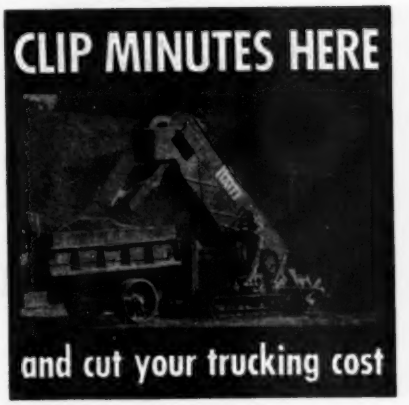

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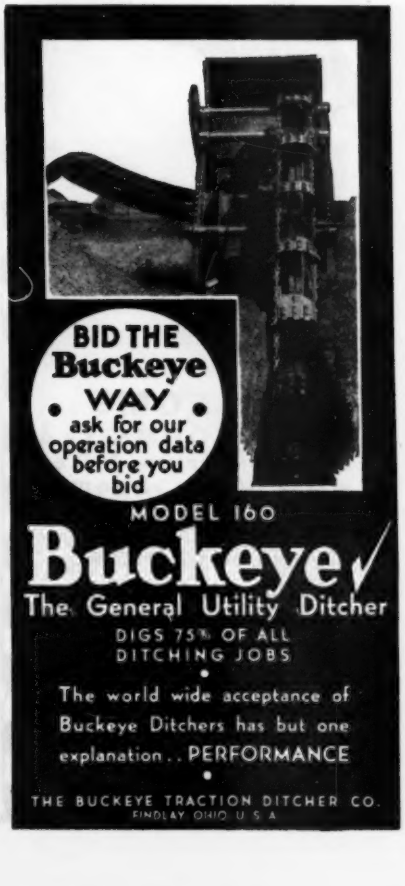
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Streets and Roads (Continued)

$12,900. W.P.A. labor. Grand total $46,187. W. A. Bates, Darien, W.P.A. engr.

Conn., Bridgeport — City, sidewalks, curbing Birdseye St., $4,061; bituminous macadam paving Coggeswell, 2nd section between Horace and Asylum Sts., $24,880. W.P.A. labor. P. Brewster, dir. P. Wks.

Conn., Danbury—City, constructing concrete sidewalks and curbs in various sections of city. W.P.A. labor. $30,690. Elijah Sturdevant, supt. P. Wks.

Ill., Macomb—Dpt. P. Wks. & Buildings, Div. Hys., Springfield, concrete paving 1.1455 mi. Sect. 4-CS and 0.6483 mi. Sect. 5-CS road in Macomb, to F. F. Wier Constr. Co., Moline, $86,622 and $45,706 respectively. Bids Dec. 12. Noted Nov. 29, C. D.—Dec. 5, E. N.-R.

Indiana — State Hy. Comn., Indianapolis, crushed stone surfacing 7.182 mi. road in Martin and Greene Counties, 20 ft., to Myers & Gorman, Campellsburg, $107,573. Est. $136,141. Bids Dec. 3.

Indiana—State Hy. Dpt., Indianapolis, waterbound macadam paving 6.303 mi. road in North Webster, Kosciusko Co., to D. A. Y. Constr. Co., Marion, $161,751. Est. $211,371. Bids Dec. 3. Noted Dec. 10, C. D.—Nov. 28, E.N.-R.

Indiana—State Hy. Comn., Indianapolis, rein.-con. paving 1.935 mi. Lake Co., to W. D. Vogel, 1103 Merchants Bank Bldg., Indianapolis, $72,389 est. $80,652***6.847 mi. Grant Co., to N. B. Putnam, 206 Transfer St., Fort Wayne, $82,965 est. $104,066***0.671 mi. DeKalb Co., to Brand & Deal, West Beardsley Ave., Elkhart, $40,715 est. $50,613***crushed stone surfacing 2.24 mi. Lawrence Co., to Kile & Killman, Salem, $29,172 est. $41,291***drainage 0.083 mi. road in Martin Co., to E. R. Campbell, Sandborn, $8,392 est. $9,411. Grand total $233,633. Bids Dec. 17. Noted Dec. 19, C. D.—Dec. 5, E. N.-R.

Iowa—State Hy. Comn., Ames, concrete paving 1.137 mi. Franklin Co., to F. Carlson Co., Decorah, $29,075***0.356 mi. Humboldt Co., to Metz Constr. Co., Clear Lake, $22,891*** grading 4.171 mi. Clarke Co. and 3.444 mi. Johnson Co., to C. F. Betz, Sioux City, $17,291 and $11,736 respectively***0.184 mi. Ringgold Co., to C. L. Lundeen, Montezuma, $12,350 ***graveling 19.087 mi. Des Moines Co., and 18.033 mi. Johnson Co., to S. P. Moore, Cedar Rapids, $22,304 and $26,467 respectively***road in Des Moines Co., to Dixon Constr. Co., Centerville, $6,937***9.804 mi. Lee Co., to Automatic Gravel Products Co., Muscatine, $4,475***5.552 mi. Monona Co., to Mandlin Constr. Co., Webster City, $16,569. Grand total $170,095. Bids Nov. 26, awarded Jan. 17. Noted Nov. 21, C. D.

Iowa—State Hy. Comn., Ames, paving 1.387 mi. road in Delaware Co., to C. W. Shirley, Waterloo, $40,470***0.269 mi. Cass Co., to Booth & Olson, Inc., Sioux City, $12,347*** 2.419 mi. Cherokee Co. and 0.294 mi. Crawford Co., to J. W. Scothorn, Cherokee, $9,500 and $11,028 respectively***6.356 mi. Cherokee and Buena Vista Counties, to M. T. McGuire, Algona, $29,151***4.904 mi. Fremont and Mills Counties, to J. A. Carlson Constr. Co., Omaha, Neb., $14,668. Grand total $117,164. Bids Dec. 10, awarded Jan. 17.

★ **Louisiana** — State Hy. Comn., Baton Rouge, to Robinson & Young, Baton Rouge, grading, surfacing 7.481 mi. Bourg-Larose Hy., Project 610-B, Lafourche Parish, $45,226; 5.329 mi. West Baton Rouge Hys., Group 1, Project 1089, West Baton Rouge Parish, $25,479; 5.5 mi. Intersection Route 3-Jackson Hy., Project 1090, West Feliciana Parish, $7,706; 8.616 mi. Ascension Hys., Group 2, Project 1091, $34,421; surfacing 6.5 mi. Paradise-Bayou Des Allemands Hy., Project 1093, St. Charles Parish, $16,025***to J. W. King, Columbia, 2.14 mi. Ft. Necessity-Turkey Creek Hy., Project 692-C, Franklin Parish, $6,245*** to J. J. McKeithen, Grayson, 7.677 mi. Enterprise-Rosefield Hy., Project 770-A-2, Catahoula Parish, $15,364***grading, surfacing 4.298 mi. Liddieville-Fort Necessity Hy., P. 842-A, WPSO 270, Franklin Parish, $29,430***to T. S. Clements, Shreveport, concrete paving 2.767 mi. Batchelor-Innis Hy., Project 4805-C, USWP Hy. Project WPSS 294, Pointe Coupee Parish, $66,660***to Nelson Bros., Baton Rouge, grading, surfacing 3.37 mi. Sikes-Olla Hy., Project 812-G, USWP Hy. Project WPSO 292, Winn Co., $46,291; 4.128 mi. Jones' Bayou-Monterey Hy., Project 880-A, USWP, Project WPSO 265, Catahoula Parish, $26,914***to C. R. Laborde, Bordelonville, 3.314 mi. Coules Des Coures-Int. Route 5, P. 8886-A, Avoyelles Parish, $19,930***to Barber Bros. Constr. Co., Inc., Baton Rouge, 6.167 mi. Lewisburg-Pitreville Hy., Project 914-A, St. Landry Parish, $29,643***to J. F. Campbell Co., 1008 Orleans St., New Orleans, 1.629 mi. Airline-Reserve Hy., P. 977-A, USWP Hy. Project WPSO 284, St. John the Baptist Parish, $10,865*** to Doullut & Ewin, Inc., Q and C Bldg., New Orleans, 6.81 mi. Jefferson Davis Hys., Group 1, P. 1086, Jefferson Davis Parish, $31,981*** to Sullivan, Long & Hagerty, Bessemer, Ala., 5.811 mi. Calhoun-Cadeville Hy., P. 1087, Ouachita Parish, $46,121***to R. B. Tyler Co., 1446 Levering St., Louisville, Ky., 2.5 mi. Fluker-Intersection Route 1095, Project 1088, Tangipahoa Parish, $12,312***to T. L. James & Co., Inc., Ruston, 9.123 mi. Tensas Hys., Group 2, P. 1095, Tensas Parish, $37,295 ***to J. Kilcoyne, Mer Rouge, 4.077 mi. Sid Humphrey Rd., P. 1096, Morehouse Parish, $16,992***to Huth Constr. Co., Inc., Franklin, 2.777 mi. Intersection Route 30-Belle View Plantation Hy., P. 1097, Iberville Parish, $8,787. Grand total $533,687. Bids Jan. 8. Noted Jan. 20, C. D.—Jan. 2, E. N.-R.

Massachusetts—Commonwealth of Massachusetts, Dpt. P. Wks., W. F. Callahan, constr., 100 Nashua St., Boston, bituminous macadam paving 13,930 sq.yd., 3,085 sq.yd. bituminous concrete sidewalks, F.A. Project 222-B, Greenfield, to A. Pandiscio, 44 Henry St., Fitchburg, $60,345. Bids Jan. 7, awarded Jan. 17. Noted Jan. 17, C. D.

Michigan—State Hy. Comn., Escanaba, grading, drainage structures 5.678 mi. WPH-39C-1, Ontonagon Co., to Fox Valley Constr. Co., Marquette, $154,604. Bids Dec. 13. Noted Dec. 23, C. D.

★ **Michigan**—State Hy. Dpt., Lansing, shaping, concrete paving 2.364 mi. F50-6C-9, and grading, drainage structures 2.364 mi. WPMH-50-6C-8, both Macomb Co., to Taylor Bros. Co., Inc., Birmingham, $138,014 and $58,006 respectively***grading, drainage, concrete paving 3.849 mi. F53-2C-4 and F53-17C-1, Mason Co., to L. W. Edison, Grand Rapids, $154,103***shaping, concrete paving 6.023 mi. F37-12C-3, Isabella Co., to Vinton Constr. Co., Coldwater, $123,959***grading, drainage structures 6.023 mi. WPH-37-12C-2, Isabella Co., to Bridgeport Core Sand Co., Saginaw, $38,101 ***1.03 mi. WPMH-77-53C-1, St. Clair Co., to J. H. Baker & Sons, Port Huron, $16,508. Grand total $529,591. Bids Dec. 12. Noted Dec. 23, C. D.

Minnesota—State Hy. Dpt., St. Paul, grading 6 mi. State Project 23-185-21 3C and D and S.P. 23-185-21 2A and B. WPGH 506 G1, WPGH 503 G2, between Bruno and Kerrick, incl. 238,096 cu.yd. excav., to Whitmas & Borz, Bovey, $61,102. Bids Dec. 13. Noted Dec. 5, C. D.

N. J., Newton—Sussex Co., constructing Indian and Mohawk Trails, in Hopatcong, to Francisco Bros., Ridge Rd., Little Falls, $37,694. Noted Nov. 15, C. D.—Nov. 21, E. N.-R.

N. Y., Gloversville — City, removing car tracks and paving Main St., to Morrell Vrooman, Inc., 21 North Main St., $49,433. P.W.A. Bids Dec. 5. Noted Dec. 13, C. D.

Ohio—J. J. Jaster, Jr., Ohio Hy. Dir., Columbus, grading, drainage structures, roadside improvement, rein.-con. paving 2.239 mi. Toledo Western Rd., Lucas Co., to McKechnie-Peirce Co., 112 East Woodruff Ave., Toledo, $218,935 ***grading, drainage structures, concrete widening 1.421 mi. Gilead Western Rd., Marion Co., to Batdorff-Martin Co., 117 South Hazel St., Upper Sandusky, $78,762. Bids Jan. 17. Noted Jan. 13, C. D.

Ore., Hood River—City, paving and patching road, to Warren Northwest, Inc., Portland, $31,660. P.W.A. Bids Jan. 15.

Pennsylvania—P. M. Tebbs, for W. Van Dyke, secy., Hys., Harrisburg, rein.-con. paving 1.47 mi. Route 331, Sect. A, DuBoistown Boro, Armstrong Twp., Lycoming Co., to F. D. Kessler Co., Inc., 138 Queen St., Northumberland, $43,765; rein.-con. paving 0.85 mi. hy. and rein.-con. arch bridge, Route 3, Sect. 1-A, Woodward Twp., Lycoming Co., to Randecker Bros., 221 Clinton St., Lock Haven, $61,182. Bids Dec. 27. Noted Jan. 13, C. D.—Dec. 19, E. N.-R.

Pennsylvania—P. M. Tebbs, for W. Van Dyke, secy. Hys., Harrisburg, bituminous on native stone paving 0.22 mi. Route 221, Sect. 5, Route 11051, Sect. 1, Hastings Borough, Cambria Co., to L. R. Owen, Johnstown, $7,014***rein.-con. bridge, grading, drainage 1,140 ft., Route 19020, Mifflin Twp., Columbia Co., to R. Rosser, 55 South Washington St., Wilkes-Barre, $6,244. Bids Jan. 3. Noted Jan. 10, C. D.

Pennsylvania—P. M. Tebbs, for W. Van Dyke, secy. Hys., Harrisburg, rein.-con. paving, 8 in. rein.-con. structures, shoulder grading 5.38 mi. Route 496, Sect. 5, Springfield Twp., Erie Co., to Baldwin Bros., Paving Co., 652 Union Trust Bldg., Cleveland, O., $219,633. Bids Jan. 10. Noted Jan. 15, C. D.

Pennsylvania—P. M. Tebbs, for W. Van Dyke, secy., Hys., Harrisburg, rein.-con. paving, drainage, bituminous on crushed stone surfacing 0.81 mi., Route 126, Sect. 1, Berwick Twp., Abbottstown Boro, Adams Co., to Hempt Bros., Camp Hill, $49,177. Bids Dec. 20. Noted Jan. 2, C. D. —Jan. 9, E. N-R

Pensylvania—P. M. Tebbs, for W. Van Dyke, secy. Hys., Harrisburg, **grading, drainage** 1.87 mi. Route 32071, Rayne Twp., Indiana Co., and timber deck I-beam bridge on same hy., to Minns Bros., 17 East Du Bois Ave., Du Bois, $18,875***rein.-con paving 1.43 mi. Route 228, Sect. R-5, White Twp., Indiana Borough, Indiana Co., to W. M. Mumma, 10th and Mulberry Sts., Harrisburg, $72,769***rein.-con. paving 0.39 mi. and I-beam overpass bridge, Route 22, Sect. 2, Lawrence Twp., Tioga Co., to Harry T. Campbell Sons & Co., Towson, Md., $103,351. Grand total $194,995. Bids Dec. 27. Noted Jan. 13, C. D.—Dec. 19, E. N.-R.

Pennsylvania—P. M. Tebbs, for W. Van Dyke, secy. Hys., Harrisburg, bituminous on native stone paving 1.03 mi. Route 49086, Sect. 1, Route 49-18, Sect. 1, Mt. Carmel Twp., Northumberland Co., to Peffer & Viall, Mt. Holly Springs, $27,043. Bids Dec. 20. Noted Jan. 2, C. D.—Jan. 9, E. N.-R.

South Carolina—State Hy. Dpt., Columbia, grading 6.134 mi. U. S. Route 15, W.P.H. 359-F, Sumter Co., to Boyle Road & Bridge Co., Sumter, $21,501***earth type surfacing 3.972 mi. Route 95, W.P.S.S. 410 and W.P.M.S. 410, Chesterfield Co., to Hubbard Constr. Co., Marion.

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†*Federal Government*

Streets and Roads (Continued)

857,307***earth grading 1.189 mi. W.P.G.H. 403 and W.P.G.M. 403, Contr. 1, Union Co., to Rickenbacker Constr. Co., Union, $38,937. Grand total $117,745. Bids Nov. 12. Noted Nov. 20, C. D.—Nov. 7, E. N.-R.

South Carolina—State Hy. Dpt., Columbia, concrete paving 0.308 mi. U. S. Route 1, approaches to bridge over S. A. L. R. R., WPGH 46, Kershaw Co., to Carolina Contg. Co., Columbia, $37,190***0.616 mi. U. S. Route 52, approaches to bridge, WPGH 218 and extension and State Project 218 extension, Berkeley Co., to J. B. Britton, Sumter, $42,526***bituminous surfacing 0.623 mi. U. S. Routes 17 and 13, WPGH 346-C, WPGM 346-C and State Project 346-C, Beaufort and Jasper Counties, to H. M. Taylor, Ridgeland, $41,298. Grand total $121,-014. Bids Nov. 5, awarded Jan. 15. Noted Nov. 14, C. D.—Oct. 31, E. N.-R.

Tennessee—Dpt. Hys. & P. Wks., Memorial Bldg., Nashville, paving 1.093 mi. State Hy. 27, WPMH 2-C, Hamilton Co., to Wesco Co., Riverside Dr., Chattanooga, $109,273***grading, drainage 3.741 mi. State Hy. 61, WPSS 287-C, Roane Co., to A. T. Anz, Marshall, N. C., $59,822***6.029 mi. Non-System Hy., WPMS 426-A, Parts 1 and 2, Shelby Co., to R. F. Pryor & Co., Mayfield, Ky., $97,279. Grand total $266,374. Bids Jan. 17. Noted Jan. 22, C. D.—Jan. 9, E. N.-R.

★ **Texas**—G. Gilchrist, state hy engr., Austin, grading, drainage structures, triple asphalt on caliche base course and crusher run broken stone base course surfacing 9.135 mi. State Hy. 27, F.A.P. 619-E, Crockett Co., to R. W. Briggs & Co., Pharr, $97,366 est. $100,-000***limestone rock asphalt on concrete paving 12.008 mi. State Hy. 9, F.A.P. 657-I, Nueces Co., to Heldenfels Bros., Rockport, $284,228 est. $280,000***road oil and triple asphalt on crushed caliche rock base course surface treating 9.095 mi. State Hy. 3, F.A.P. 664-B, Brewster and Presidio Counties, and 8.147 mi. State Hy. 3, F.A.P. 664-E, Brewster Co., to W. W. Vann & Co., Kerrville, $117,-739 and $103,752 respectively est. $120,000 and $110,000 respectively***grading, drainage structures 5.613 mi. State Hy. 26, F.A.P. 203-D, Part 1, Rusk Co., to J. S. Moore & Sons, Lufkin, $63,325 est. $70,000***5.173 mi. State Hy. 26, F.A.P. 203-D, Part 2 and 203-B, reopened, Part 2, Rusk Co., to J. Lee and E. A. Vilbig, 2517 Eakin St., Dallas, $107,132 est. $120,000***asphaltic concrete surfacing, widening base 9.761 mi. State Hy. 20, F.A.P. 236, reopened, Part 2, Washington Co., to Austin Road Co., 1813 Clarence St., Dallas, $150,765 est. $155,000. Grand total $924,307. Bids Dec. 31. Noted Jan. 13, C. D.

Utah—State Rd. Comn., Salt Lake City, concrete paving 1.43 mi. road in Salt Lake Co., to Gibbons & Reed, 165 East 4th St. S., Salt Lake City, $52,942. Est. $48,992. Bids Jan. 17. Noted Jan. 9, C. D.

Virginia—State Hy. Dpt., Richmond, concrete paving 1 mi. road in Henrico Co., to J. P. McGuire Constr. Co., Durham, N. C., $32,228 ***5.4 mi. north of Bastian, to Pendleton Constr. Co., Wytheville, $68,697***2.4 mi. road in Campbell and 5.5 mi. Buckingham Co., to Chandler Bros., Inc., Virgilina, $180,594 and $50,626 respectively***0.37 mi. in Roanoke, to P. L. Baird, 824 Wycliffe Ave., S., Roanoke, $6,727***0.2 mi. in Richmond, to Atlantic Bitulithic Co., Richmond, $25,074***road in Halifax, to Battershill-Jones & Co., Virgilina, $42,510. Grand total $405,456. Bids Jan. 16. Noted Jan. 22, C. D.—Jan. 9, E. N.-R.

Washington—L. V. Murrow, dir. Hys., Olympia, bituminous macadam surfacing 0.72 mi. city streets in Vancouver, Clark Co., to Warren Northwest, Inc., P. O. Box 5072, Portland, Ore., $15,702***grading treated timber, steel overcrossing Northern Pacific Ry. Co., 1.17 mi. Walla Walla Co., to J. Coyle, 901 Westlake St. N., Seattle, $46,679***timber, steel overcrossing 0.124 mi. King Co., to Newton Constr. Co., 2653 West Newton St., Seattle, $27,972 ***clearing, grading, gravel surfacing 1.01 mi. Junction State Rd. 8, to Carson, Skamania Co., to Sam Angelo, Cape Horn, $20,246***clearing, grading 0.199 mi. Cascade Creek Fill, San Juan Co., to C. V. Wilder, Blaine, $3,266***clearing, grading, crushed stone surfacing 1.043 mi. Republic to Curlew Rd., Ferry Co., to L. J. Lavin, Coulee City, $13,722***2.4 mi. Big Lake N. W. Rd., Skagit Co., to R. Nordlund, Mount Vernon, $25,499***10.7 mi. County Rd. in Raymond, Pacific Co., to Graham Bros. & Medley, 974 North St., Chehalis, $10,788***grading, draining 1.311 mi. Reardon-Long Lake Rd., Lincoln Co., to J. W. Poe & Co., 1122 16th Ave., Lewiston, Idaho, $14,450***crushed stone surfacing 7.483 mi. Horn to Benton City Rd., Benton Co., to Joslin & McAlister, 2028 East Trent Ave., P. O. Box 1174, Spokane, $9,326 ***grading, asphaltic concrete paving 1.666 mi. Battleground Hy. Vancouver East, Clark Co., to United Contg. Co., 811 Stock Exchange Bldg., Portland, Ore., $24,001***clearing, grading 2.14 mi. Freeland North, Island Co., to J. H. Coyne, Hastings Bldg., Port Townsend, $15,-742. Grand total $227,393. Bids Jan. 14. Rejected bids Jan. 14, bituminous macadam paving 0.307 mi. road in Raymond, Pacific Co., and 1.156 mi. in Cowlitz Co. Noted Jan. 8, C. D.

Wisconsin—State Hy. Comn., Madison, grading, draining, concrete paving 0.398 mi. Fond du Lac Co., to Madison Paving Co., 515 West Johnson St., Madison, $28,432***0.416 mi. Milwaukee and Waukesha Counties, to Milwaukee General Constr. Co., 2121 South 13th St., Milwaukee, $62,598***0.493 mi. Clark Co., to Universal Eng. Co., Medford, $17,939*** graveling Marathon Co., to C. Berg, Campbellsport, $9,556***2.873 mi. Waupaca Co., to F. Mashuda, 2213 South 57th St., Milwaukee, $33,083***5.587 mi. Marathon Co., to J. E. Schultz, Albany, $21,889***6.692 mi. Dunn Co., to W. W. Magee Co., 118 West Central Ave., St. Paul, Minn., $116,842***3.068 mi. Price Co., to Peterson Constr. Co., 610 Wesley Temple Bldg., Minneapolis, Minn., $35,371*** 1.005 mi. Iowa Co., to P. W. Ryan Sons, 303 South 3rd St., Janesville, $11,399***constructing superstructure and concrete surfacing 0.204 mi. Jefferson Co., to Milwaukee Bridge Co., 3882 North 34th St., Milwaukee, $93,719*** grading, draining, graveling and structure on 0.178 mi. Trempealeau Co., to Universal Eng. Co., Medford, $36,988***bridge in Lafayette Co., to Eau Claire Eng. Co., Eau Claire, $11,-365***60 ft. I-beam span in St. Croix Co., to J. E. Hinman & Son, Glenwood, $14,265. Grand total $493,446. Bids Jan. 17. Noted Jan. 22, C. D.

†**Wis., Trempealeau**—U. S. Eng., St. Paul, Minn., resurfacing access road at Lock and Dam 6, Mississippi River, to Holtzhammer & Kaiser, 1607 South 8th St., La Crosse, $2,355. Bids Jan. 3. Noted Dec. 16, C. D.—Dec. 19, E. N.-R.

Ont., Keewatin—Dpt. Northern Development, Ottawa, constructing 2¼ mi. Trans-Canada Hy., wooden bridge at Cameron Bay, near Norman, and steel bridge at Keewatin Channel, to Assiniboia Constr. Co. Ltd., Kenora. Est. about $45,000.

EARTHWORK IRRIGATION DRAINAGE AND WATERWAYS

PROPOSED WORK

Calif., Beaumont—Beaumont Irrigation Dist., considering various makes of pumping equipment to be installed in new well now being drilled. To exceed $1,000. U. S. Murphy, supt.

†**Conn., New London**—U. S. Eng., Providence, R. I., making plans dredging at State Pier and additional improvements to waterway. $16,450.

Idaho Council—Little Weiser Irrigation Dist. plans constructing Ben C. Rose Reservoir at Anderson Gulch. $60,000. P.W.A. project. Bonds voted.

Neb., Omaha — Douglas Co., Court House, plans fills, excavation, some reinforcements for Mud Creek. $19,055. D. F. McCauley, Bus Bldg., W.P.A. engr.

†**Pa., Erie**—U. S. Eng., Buffalo, N. Y., plans deepening of Erie Harbor channel, more than 21 feet to ore docks. $41,000.

Pa., Gettysburg — Comrs. Adams Co. plans reconstructing Nary's Dam on Big Marsh Creek, 1 mi. from Ortana, reconstructing Hartman's Dam on Big Marsh Creek, ½ mi. from Hilltown, both Franklin Twp.

Wash., Everett—Snohomish Co., Court House, plans flood control work on Pilchuck River. $136,000. H. J. Wild, Federal Office Bldg., Seattle, engr.

N. S., Halifax—Point Pleasant Park Comrs., B. A. Weston, pres., plans breakwater at Prince of Wales Cove.

BIDS ASKED

Conn., New London—See "Unclassified."

†**Texas**—Feb. 16, by U. S. Eng., Galveston, repairing outer end of East Jetty at Sabine Pass, incl. picking out and replacing old cover stone, filling voids in jetty with rip rap and gravel or broken stone, capping jetty with concrete, except that no water will be required at old red beacon and at outer light.

Tex., Beaumont—Beaumont Navigation Dist., c/o E. E. Blumly pres., taking bids regulating dam. $45,000. P.W.A. granted $21,272 allotment. Harrington & Cortelyou, 1004 Baltimore Ave., Kansas City, Mo., engrs. Noted Aug. 30, C. D.—Sept. 5, E. N.-R.

†**Tex., Galveston**—Feb. 14, by U. S. Eng., Galveston, dredging 125,000 cu.yd. from channel to 24 ft. depth.

†**Tex., Port Aransas**—Feb. 10, by U. S. Eng., Galveston, dredging 469,000 cu.yd. from Inner Basin on western end of Port Aransas Harbor.

†**Tex., Port Aransas**—Feb. 24, by U. S. Eng., Galveston, Tex., jetty repairs and improvements, removing and replacing stone and installing three 36 in. diam. pipe fishways culverts through South Jetty.

†**Utah, Roosevelt**—See "Contracts Awarded."

CONTRACTS AWARDED

Calif., Oleum—Union Oil Co., 220 Montgomery St., San Francisco, reconstructing wharf, piling, flooring, etc., to Healy-Tibbitts Constr. Co., 64 Pine St., San Francisco, $37,780. Private plans.

Ga., Augusta—City, constructing canals, locks, etc., Contrs. 1 and 2, to Claussen & Lawrence, Augusta, $12,000 and $24,990 respectively. P.W.A. Bids Dec. 9, awarded Jan. 14. Noted Dec. 4, C. D.—Dec. 5, E. N.-R.

†**Minn., Winona**—U. S. Eng., 615 Commerce Bldg., St. Paul, clearing Parcels 5a, 6 and 7 pool area Lock and Dam 5a, Mississippi River, to W. W. Magee Co., 118 Central Ave., St. Paul, $32,900. Bids Dec. 31. Noted Jan. 9, C. D.—Dec. 26, E. N.-R.

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†*Federal Government.*

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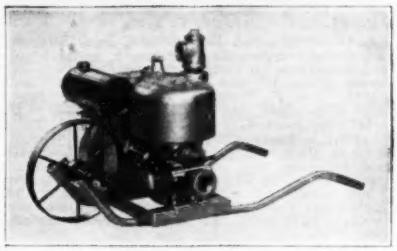

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Earthwork, etc. (Continued)

†**Nev., Elko**—U. S. Indian Irrigation Service, 751 South Figueroa St., Los Angeles, Calif., constructing variable radius concrete arch dam across Owyhee River, 70 mi. north of here, to J. A. Tertelling & Sons, 2232 Fairview Ave., Boise, Idaho, $94,770. Bids Jan. 4. Noted Jan. 21, C. D.—Dec. 26, E. N.-R.

★ †**Utah—Bureau Reclamation, Dpt. Interior,** Ogden, constructing earthwork, canal lining and structures on Ogden-Brigham Canal and between Stas. 10 and 335 on South Highland Canal, to J. W. Tertelling & Son, Boise, Idaho, $424,978. Bids Dec. 20. Noted Jan. 15, C. D.—Dec. 5, E. N.-R.

†**Utah, Roosevelt**—U. S. Indian Service, Myton, Utah, constructing concrete headgate and diversion dam at head of Gray Mountain Canal, enlarging Gray Mountain Canal, draining 8,500 acres land and improving and enlarging Whiterocks Canal, Uinta Irrigation Project, day labor, $150,000. P. F. Henderson, Myton, engr.

FEDERAL POWER COMMISSION

Applications for Licenses and Permits

Licenses

1354—San Joaquin Light & Power Corp., Fresno, Calif., wants license constructing power project on north fork of San Joaquin River in Madera Co.

1355—Montana Power Co., Butte, Mont., wants license constructing (or partly constructing), transmission line affecting public lands in Jefferson Co.

1356—Montana Power Co., Butte, Mont., wants license constructing transmission line affecting public lands in Jefferson Co.

1357—Storfold & Grondahl Packing Co., Mutual Life Bldg., Seattle, Wash., wants license constructing power project on unnamed creek, on north shore of Washington Bay, Kuiu Island, 1st Judicial Div., Alaska, affecting lands in Tongass Natl. Forest.

1358—Smith Mountain Power Co., 111 South Fairfax St., Alexandria, Va., and 522-24 Mills Bldg., Wash., D. C., wants license power project on Roanoke River at Smith Mountain, Pittsylvania, Bedford and Franklin Counties.

UNCLASSIFIED

PROPOSED WORK

Florida—ELECTRIC DISTRIBUTION LINES—Florida Power Corp., Tallahassee, plans 185 mi. rural electric distribution lines in Alachua, Citrus, Columbia, Gadsen, Hernando, Liberty, Marion, Pasco, Pinellas, Suwannee and Wakulla Counties. Est. about $165,000.

★ **Idaho, Coeur d'Alene**—POWER SYSTEM—City, City Hall, appealed to circuit court of appeals at San Francisco, from injunction granted to Washington Water Power Co., restraining city from accepting federal loan and grant. $650,000.

★ **Missouri** — RAILROAD — Missouri Pacific R. R. Co., S. L. Wonson, asst. ch. engr., Missouri Pacific Bldg., St. Louis, improvements and purchasing equipment, incl. 17,000 tons rails during 1936. $6,422,000.

N. Y., Buffalo—GASOLINE FILLING STATIONS—Hambleton Terminal Corp., G. K. Hambleton, pres., 300 Woodbridge Ave., plans chain gasoline filling stations at various locations, incl. steel tanks, electric pumps and equipment. $50,000 or more. Architect not appointed.

Okla., Oklahoma City—OIL PIPE LINE—Triangle Oil Co., 1st Natl. Bank Bldg., made plans 2½ mi. 6 in. oil pipe line in Oklahoma City field. $35,000. E. D. Hill, Insurance Bldg., engr.

Okla., Oklahoma City—PIPE LINE—Magnolia Petroleum Co., Magnolia Bldg., Dallas, Tex., preliminary plans made 5 mi. 8 in. oil pipe line in Oklahoma city oil field. $75,000.

Okla., Oklahoma City—PIPE LINE—Sinclair-Prairie Oil Co., Independence, Kan., made plans 11,000 lin.ft. 6 in. oil line in South Oklahoma City field. $25,000. E. D. Hill, engr.

Pa., Harmarville — COAL PROPERTIES — Wheeling Steel Co., Wheeling, W. Va., plans improvements to coal properties as part of expansion program. $37,000 or more.

Pa., Titusville—AIRPORT—City, City Council, H. L. Matthews, city clk., plans to establish and develop modern municipal airport, incl. hangars, administration building, service shops, lighting, grading, runways, etc. $155,000. May apply to W.P.A. for funds. City Engineer, engr.

★ **Texas**—PIPE LINE—American Liberty Pipe Line Co., c/o D. S. Golding, 1st Natl. Bank, Dallas, plans 200 mi. 8 in. pipe line between Rusk and Conroe. $1,200,000.

Texas and New Mexico—PIPE LINE—Gulf Pipe Line Co., McCamey, plans 65 mi. 8 in. pipe line from Hendrick oil fields, Winkler Co., Tex., to Hobbs Fields, Lee Co., New Mex.

Tex., Beaumont—AIRPORT—City soon takes bids municipal airport, incl. runways, hangar, repair shop, landing signals, night lighting, etc. $48,000. $31,847 W.P.A. allotted. R. C. Black, city engr.

Tex., Marfa—NATURAL GAS SYSTEM—City, H. Coffield, mayor, soon takes bids natural gas system, incl. mains, booster station, meters, equipment, etc. $72,600. P.W.A. project.

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Wash., Blaine—BOAT HAVEN—Port Bellingham plans boat haven. $27,000. W.P.A. funds asked. E. M. Adams, port mgr.

Wash., Seattle—ARBORETUM—City, County City Bldg., making plans constructing arboretum. $167,899. W.P.A. funds allotted. W. C. Hall, Jr., Park Dpt., 4th and Battery Sts., engrs.

W. Va., Charleston—NATURAL GAS DEVELOPMENT—United Carbon Co., P. O. Box 1475, plans development natural gas area in Kanawha Co., incl. drilling deep wells, laying pipe lines, purchase connection. To exceed $22,000. Private plans.

W. Va., Moundsville—COAL PROPERTIES—Wheeling Steel Co., Wheeling, plans improvements to coal properties as part of expansion program. To exceed $57,000. **Maturity later.**

B. C., Nanaimo—PETROLEUM DEVELOPMENT—Vancouver Island Petroleum Co. Ltd., 3 Imperial Bldg., 97 Commercial St. plans development this spring, $25,000.

★ **Ontario**—POWER DEVELOPMENTS—Ontario Hydro-Electric Power Com., T. S. Lyon, chn., Toronto, plans power development, involving rock excavation, wood stave piping, concrete work, hydraulic machinery and installation of turbines and generators, Rat Rapids and Ear Falls. $800,000.

Ont., Ear Falls—POWER DEVELOPMENT—See "Materials and Equipment."

Ont., Niagara Falls—POWER LINE—Canadian Niagara Falls Power Co. plans 44,000 volt power line to Ridgeway.

★ **P. E. I., Charlottetown**—PIER, SHEDS, etc.—Bd. Trade, W. L. Higgin, secy., plans constructing pier, sheds and factory at Harbour Front. $1,000,000.

BIDS ASKED

Calif., Sacramento—SWIMMING POOL, etc.—City Council bids about Feb. 13, 65x165 ft., rein.-con. swimming pool and clubhouse. To exceed $75,000. H. Devine, Cronan Bldg., engr.

Conn., New London—PIER IMPROVEMENTS—Feb. 3, by Rivers, Harbors & Bridges Comn., New London, improvements to State Steamship Terminal, consisting of Div. A, new fender system and marginal planking, Div. B, new roof covering on two one story pier sheds, flashing, repairs to skylights, etc. and Div. C, dredging in the 2 slips and the approach to the pier, W. E. Clarke, secy. and resident engr. Noted Jan. 9, C.D.—Jan. 16, E.N.-R.

Conn., Middletown — GUARD RAIL — See "Contracts Awarded."

Me., Auburn—AIRPORT—See "Contracts Awarded."

Massachusetts—TRANSMISSION LINE, etc.—Feb. 3, by Eastern Mass. Street Railway Co., 27 Torrey St., Brockton, and 38 Chauncy St., Boston, clearing 19.47 mi. high tension transmission line right-of-way of brush, undergrowth, timber, etc., 50 ft. wide through Brockton, Taunton, West Bridgewater, Bridgewater, Raynham, Berkeley and Freetown. Private plans.

N. Y., Brooklyn—COMFORT STATION—See "Contracts Awarded."

N. Y., Long Island City—SWIMMING POOL FILTER HOUSE—See "Contracts Awarded."

N. Y., New York—COMFORT STATION, etc. See "Contracts Awarded."

N. Y. New York—PARK PAVILION, etc.—See "Contracts Awarded."

N. Y., Rochester — AIRPORT IMPROVEMENTS—See "Contracts Awarded."

Utah and Colorado—RAILROAD—See "Contracts Awarded."

Wash., Pullman — STADIUM — Feb. 8, by E. V. Foster, graduate mgr. Washington State College, constructing stands seating 28,000, of which 14,000 will be under cover, 105x390 ft. in size with alternate 75x300 ft., structural steel roof, rein.-con., frame exterior. $110,000. S. A. Smith, Pullman, archt.

CONTRACTS AWARDED

Conn., Middletown—GUARD RAIL—City, P. Wks. Dpt., constructing 8 miles guard rail on Brooks Rd., W.P.A. labor. $23,243.

Louisiana—OIL PIPE LINE—Continental Oil Co., Ponca City, Okla., oxyacetylene weld 45 mi. 8 in. pipe line from Lake Charles to Basile, in conjunction with steel oil pipe line out of Lake Charles, to Apex Constr. Co., 2nd Natl. Bank Bldg., Houston, Tex., about $5,000 per mile. Noted Nov. 28, E. N.-R.

Me., Auburn—AIRPORT—City, Dpt. P. Wks., F. W. Ford, city mgr., City Hall, soon starts construction of airport by day labor under W.P.A., incl. grading, excavation, drainage, etc. $37,500. Owner purchases supplies and tools.

Mich., Detroit—POWER LINES, etc.—Public Lighting Comn., L. J. Schrenk, genl. supt., 174 East Atwater St., furnishing 36,500 ft. of 350,000 C.M., 3-conductor, 24,000 volt cable, also 11,500 ft. of 2/0 3-conductor cable for extensions to public lighting system, to General Cable Co., 425 New Center Bldg., $89,832; furnishing same amount cable, to Anaconda Wire & Cable Co., 644 New Center Bldg., $89,832. Est. $179,664. **P.W.A.** Noted May 22, C. D.—May 30, E. N.-R.

Mo., Washington—SWIMMING POOL—City, rein.-con. swimming pool, 2 brick bathhouses, to I. E. Millstone Constr. Co., 4343 Clayton Rd., St. Louis, $43,110. Est. $36,000. P.W.A. Bids Jan. 10, awarded Jan. 10. Noted Jan. 23, C. D.

N. J., Jersey City—PARK IMPROVEMENTS—City, Dpt. Parks & Public Property, City Hall, constructing park improvements to Bayside Park in Greenville Sect., rein.-con. grandstand, 2,500 seating capacity, park roadway. Town will furnish equipment and labor. W.P.A. materials. $80,740. H. Clark, City Hall, engr.

New York—TUNNEL—G. M. Brewster & Co., general contractors, 111 West 42nd St., New York, 1,300 tons reinforcing steel for New Jersey approach to Hudson Midtown Tunnel (New York and New Jersey), to Truscon Steel Co., Youngstown, O., for Port of New York Authority, 111 8th Ave., New York. Noted Jan. 13, C.D.—Jan. 16, E.N.-R.

N. Y., Brooklyn—COMFORT STATION—R. V. Ingersoll, pres. Brooklyn Boro. Municipal Bldg., 1 story, brick comfort station, Bway. and Lorimer St., day labor and separate contracts. To exceed $37,000. **W.P.A.** W. P. Hennessey, c/o owner, archt.

N. Y., Long Island City—SWIMMING POOL FILTER HOUSE—Dpt. Parks, Arsenal Bldg., Central Park, New York, constructing 61x162 ft. filter house for swimming pool, Barclay St. and 23rd Dr., W.P.A. labor. $125,000. Owner purchasing materials.

N. Y., New York—COMFORT STATION, etc.—Dpt. Parks, Arsenal Bldg., Central Park, constructing 35x83 ft. comfort station and recreation building, Madison Ave. and 120th St., Mount Morris Park, W.P.A. labor. $45,000. Owner purchasing materials. A. Embury, 2nd, c/o owner, archt.

N. Y., New York—PARK PAVILION, etc.—Dpt. Parks, Arsenal Bldg., Central Park, New York, constructing park pavilion, shelters, etc., Avenue B and 10th St., day labor. $75,000. **W.P.A.** A. Embury, 2nd, c/o owner, archt.

N. Y., New York—RAILROAD—See "Material and Equipment, under Proposed Work."

N. Y., Rochester — AIRPORT IMPROVEMENTS—Dpt. P. Wks., City Hall, constructing administration building at airport, by relief labor. $125,000. **W.P.A.** Noted July 19, C. D.—July 25, E. N.-R.

★ **Utah and Colorado**—RAILROAD—Denver & Rio Grande Western R. R., A. O. Ridgway, ch. engr., Equitable Bldg., Denver, Colo., roadbed improvements, purchasing and laying 60 mi. rails (110 lb), during 1936, separate contracts and day labor. Est. $6,000,000.

MATERIALS AND EQUIPMENT

PROPOSED WORK

OYSTER PACKING PLANT MACHINERY, etc.—**Hunger, Md.**—B. C. Bell & Luther Mills plans purchasing transmission, conveying and power machinery and equipment for installation in oyster packing plant.

TANK—**Webster, Mass.**—Eastern Oil Co., N. Robbins, mgr., 124 Green St., Worcester, soon takes bids 100,000 gal. steel oil storage tank, concrete found., East Main and Slater Sts.

MOTOR PATROL — **Gaylord, Minn.** — Sibley Co. soon takes bids purchasing one new motor patrol. A. Lehmann, co. hy. engr.

POWER SHOVEL — **Albion, N. Y.** — C. J. Gray, Albion, plans purchasing gasoline power shovel. $1,000.

STEEL TANK—**Elmira, N. Y.**—Delaware, Lackawanna & Western R. R. Co., G. A. Phillips, ch. engr., Hoboken, N. J., plans installing elevated steel tank. To exceed $1,000.

★ RAIL, etc.—**New York, N. Y.**—New York Central R.R. Co., J. W. Pfau, ch. engr., 466 Lexington Ave., plans purchasing 35,000 tons rail and track materials in 1936, $2,593,000. Owner will place rail by day labor and separate contracts. Project approved by Interstate Commerce Comn.

TANK—**Rochester, N. Y.**—Colonial Beacon Oil Co., 26 Bway., New York, will purchase steel gasoline storage tank for gasoline station, Main and Brown Sts. To exceed $1,000.

PIPE—**Westfield, N. Y.**—Ross Associates, c/o J. Hernandez, Halesite, plans purchasing two or more miles 2 in. iron pipe, 1,800-1,900 ft. 6- to 6½-in. steel pipe. $5,000. S. R. Ross, Box 62, Little Neck, engr.

FIRE TRUCK — **Kane, Pa.** — Borough plans purchasing new motorized fire truck and equipment. $4,000 or more. **Maturity in spring.** W. Snow, c/o owner, engr.

POWER PLANT MACHINERY and EQUIPMENT—**Ontario**—See "Public Buildings."

★ HYDRAULIC MACHINERY—**Ear Falls, Ont.**—Hydro-Electric Power Comn. of Ontario, R. T. Jeffrey, engr., 620 University Ave., Toronto, soon takes bids for hydraulic machinery, turbines, generators and equipment for $500,000 hydro-electric power development at Ear Falls on English River, 60 mi. northwest of Sioux Lookout to supply power to mines in Red Lake and Pickle Lake areas.

†*Federal Government.*

Materials, etc. (Continued)

TRANSFORMERS—Paris, Ont.—P. Utilities Comn., R. T. Thomson, chn., announces early replacement of 2 kva. transformers.

BIDS ASKED

STEAM HOIST—San Pedro, Calif.—Merritt-Chapman & Scott, San Pedro, taking bids one 3 drum steam hoist, without boiler.

†**GATE ASSEMBLIES—Denver, Colo.**—Feb. 7, by Bureau Reclamation, two 3 ft. 3 in. x 3 ft. 3 in. high-pressure-gate assemblies for Moon Lake Dam, Moon Lake Project, Utah; one 4 ft. x 5 ft. gate and one 5 ft. x 6 ft. gate with frames, hoist and appurtenances for Taylor Park Dam, Uncompahgre Project, Colo.; two 5x6 ft. high-pressure-gate assemblies for Island Park Dam, Upper Snake River Project, Idaho. R. F. Walter, ch. engr.

†**NEEDLE VALVES—Denver, Colo.**—Feb. 6, by Bureau Reclamation, Denver, four 36 in., two 48 in., two 60 in. and two 84 in. diam. interior or internal differential needle valves for installation in outlet works at Agency Valley Dam, Vale Project, Oregon; Moon Lake Dam, Moon Lake Project, Utah; Taylor Park Dam, Uncompahgre Project, Colo.; and Seminoe and Alcova Dams, Casper-Alcova Project, Wyoming. R. F. Walter, ch. engr.

BRACKET FIXTURES—Chicago, Ill.—Feb. 6, by City, City Hall, furnishing, delivering 200 aluminum bracket fixtures for Dpt. Streets & Electricity. $3,000. O. E. Hewitt, city engr.

LUMBER — Chicago, Ill. — Feb. 5, by City, City Hall, furnishing, delivering lumber for Bureau of Engineering during term ending Dec. 31, 1936. $30,000. O. E. Hewitt, city engr.

SEWER PIPE, etc.—Chicago, Ill.—Feb. 4, by City, City Hall, furnishing, delivering 20 in. and 24 in. vitr. sewer pipe for Bureau Eng., during term ending Dec. 31, 1936, $25,000; and 92,000 colonial face brick, $2,000. O. E. Hewitt, city engr.

GENERATOR, etc.—Harlan, Ia.—Feb. 7, by Bd. Trustees Municipal Electric Light Plant, furnishing 1,000 hp. Diesel engine, equipped with generator, switchboard panel, piping and wiring for electric light plant.

LUMBER, etc.—Iowa City, Ia.—Feb. 5, by Johnson Co., E. Sulek, aud., 156,000 ft. BM untreated and 84,450 ft. BM treated lumber; 3,560 lin.ft. treated piling. R. H. Justen, city engr.

PIPE—Orange City, Ia.—Feb. 4, by Sioux Co., M. J. Van Wyk, aud., 8,068 lin.ft. 18- to 42-in. corrugated metal rein.-con. culvert pipe and 6,980 lin.ft. 15 and 24 in. concrete culvert pipe. K. L. Seliger, co. engr.

†**WIRE, etc.—Eastport, Me.**—Feb. 3, by U. S. Eng., Eastport, 400 ft. cable, electric stranded wire, 5,000 volt non-metallic, sheathed, rubber insulated, underground; one duplex steam pump for pumping Bunker "C" fuel oil, for Passamaquoddy Power Project.

FIBRE PIPE, etc.—Baltimore, Md.—Feb. 5, by Bd. Awards, furnishing, delivering 3 in. fibre pipe and bands to Bureau Mechanical-Electrical Science. W. R. Straus, Municipal Bldg., mechanical-electrical engineer, B. L. Crozier, ch. engr.

IRON PIPE—Lynn, Mass.—Feb. 4, by City, 15,000 ft. 1¼ in., 1,500 ft. 1½ in., 3,500 ft. 2 in. and 500 ft. 3 in. wrought iron pipe, to Water Dpt.

CATERPILLAR TRACTOR—Crookston, Minn.—Feb. 17, by Polk Co., H. J. Welts, aud., furnishing 1 heavy caterpillar tractor. E. H. Harding, co hy. engr.

†**TRUCK—Vicksburg, Miss.**—Feb. 18, by U. S. Eng., new inclosed-cab type truck, f.o.b. Vicksburg.

†**VALVES, etc.—Vicksburg, Miss.**—Feb. 18, by U. S. Eng., Box 667, angle valves, horizontal check valves, swing check valves, globe valves; 85% magnesia sectional pipe insulation and asbestos blocks, f.o.b. Vicksburg.

†**WELDING RODS—Vicksburg, Miss.**—Feb. 18, by U. S. Eng., 5,000 lb. low carbon electrically welding rods, f.o.b. Vicksburg.

STRUCTURAL STEEL — Missouri — Feb. 6, by State Hy. Comn., Jefferson City, 29,716 lb. structural steel. T. H. Cutler, ch. engr.

SWITCHGEAR, etc.—Nebraska—Feb. 4, by Loup River Public Power Dist., C. B. Fricke, pres., 2307 13th St., Columbus, furnishing switchgear and switchboard for automatic and remote control of Monroe Hydro-electric power station, near Monroe and manual control of Columbus Hydro-electric power station, near Columbus. P.W.A. project.

PIPE, etc.—New York, N. Y.—Feb. 4, by R. Forbes, comr. Purchases, Municipal Bldg., furnishing, delivering, unloading, stacking and storing c.i. pipe, special castings, valve boxes, hydrants, valves and rodding bands to Dpt. Water Supply, Gas & Electricity.

FORGE and BLOWER, etc.—Westfield, N. Y.—Ross & Associates, Box 62, Little Neck, S. R. Ross, genl. mgr., in market for forge and blower, portable, direct-connected electric light plant, power water pump, drilling bits and stems, pipe tools and other equipment for oil and gas well drilling work.

†**NEEDLE FLATS—Cincinnati, O.**—Feb. 11, by U. S. Eng., constructing and delivering 2 steel needle flats, one each at Locks 34 and 37, Ohio River.

†*Federal Government.*

STEEL RAILS—Muskogee, Okla.—Kansas Oklahoma & Gulf Ry., R. R. Schall, secy., 135 Independence Sq., Phila., Pa., taking bids 5,700 tons rails and track fastenings. $285,000.

TRUCK CHASSIS, etc.—Easton, Pa.—Feb. 4, by C. E. Rogers, city clk., automobile truck chassis and carry-all type body. To exceed $1,000. C. A. Reese, city engr.

GENERATOR—Phila., Pa.—Peerless Laundry Co., 3551 North Randolph St., in market for belt driven generator, 2 phase, 4 wire, 220-250 volts, 200-250 kw. or engine driven unit same specifications.

TRANSMISSION and POWER PLANT EQUIPMENT, etc.—Youngsville, Pa.—Youngsville Milling Co. in market for transmission, conveying and power plant equipment and machinery for flour and feed mill, incl. grinders, etc. Noted Dec. 5, C. D., under "Industrial Buildings."

MINING EQUIPMENT—Deadwood, S. D.—Homestead Corp., c/o R. M. Harrop, Everett Blk., Council Bluffs, Ia., in market for equipment for diamond drilling for mine.

CAST IRON PIPE—Sumner, Wash.—Feb. 10, by R. G. Fryar, city clk., 500 ft. 6 in., 500 ft. 8 in. and 1,000 ft. 14 in. c.i. pipe.

CONDUIT, etc.—Tacoma, Wash.—Feb. 10, By Bd. Contracts & Awards, furnishing 16,000 ft. 4 in. I. D. fiber conduit, twelve 90 degree bends and twelve 45 degree bends, 4 in. fiber conduit, also four 1,200 ampere, 120-208 volt Y non-submersible network protectors complete. C. D. Forsbeck, City Hall, engr.

CABLES, TRANSFORMER, etc.—London, Ont.—Pub. Utilities Comn., E. V. Buchanan, genl. mgr., in market for cables, transformer and other equipment for Ann St. Substation.

SPRUCE SIDE BOARDS, etc.—Sydney, N. S.—Chappels Ltd. in market for year's supply of spruce and pine side boards.

THAWING OUTFIT—Paris, Ont.—P. Utilities Comn., R. Thomson, chn., in market for electrical thawing outfit for Water Dept.

CONTRACTS AWARDED

FIRE HYDRANTS—Los Angeles, Calif.—D. P. Nicklin, purch. agt. Dpt. Water & Power, standard pressure fire hydrants, to Rich Mfg. Co., 3851 Santa Fe Ave., $10,538. Bids Jan. 7, awarded Jan. 9.

GALVANIZED STEEL CONDUIT—Los Angeles, Calif.—D. P. Nicklin, purch. agt. Dpt. Water & Power, 207 South Bway., 4,000 ft. ¾ in., 5,000 ft. ¾ in., 3,000 ft. 1 in., 4,000 ft. 1¼ in., 6,000 ft. 1½ in. and 750 ft. 3 in. galvanized steel conduit, Spec. 1864, to Ladco Wholesale Electric Co., 2891 West Pico Blvd., $3,184. Bids Jan. 14, awarded Jan. 21. Noted Jan. 21, C. D.

LOWER BEARING ASSEMBLIES—Los Angeles, Calif.—D. P. Nickin, purch. agt. Dpt. Water & Power, 207 South Bway., furnishing as required during 18 months from date of contract, lower bearing assemblies complete with synthetic saphire jewels and lower bearings for Sangamo Type H water meters, Spec. 1835, to Sangamo Electric Co., 417 South Hill St., $45,000. Bids Jan. 7.

OIL CIRCUIT BREAKERS—Los Angeles, Calif.—D. P. Nicklin, purch. agt. Dpt. Water & Power, 207 South Bway., ten each 34.5 KV. 1,200 Amp., 60 cycle, 3 pole, single throw floor-mounted oil circuit breakers and parts for same, Spec. 1838, to Kelman Electric & Mfg. Co., 1650 Naud St., $63,690. Bids Jan. 3, awarded Jan. 21. Noted Jan. 16, C. D.

STEEL ARCH RIBS—Los Angeles, Calif.—S. A. Joseph, purch. agt. Metropolitan Water Dist., 306 West 3rd St., furnishing steel arch ribs, Schedule 1, 318 ribs, f.o.b. cars and/or trucks, bidders shipping point; Schedule 2, alternate 212 ribs, f.o.b. Banning, and 106 ribs, f.o.b. Mecca, in connection with Colorado River Aqueduct, Bid. 51635, to Youngstown Steel Car Corp., 1562 East Slauson Ave., $5,805. Bids Jan. 18, awarded Jan. 21.

†**TRACTORS, etc.—Los Angeles, Calif.**—U. S. Eng., 751 South Figueroa St., three 44 hp. tractors with angle dozer Diesel engine driven, to Crook Co., 2900 Sante Fe Ave., $10,419•••one 75 hp. tractor, to Caterpillar Tractor Co., 150 West Jefferson Blvd., $5,290••• 7 gasoline engine driven generating sets, to Rix Co., 810 Sante Fe Ave., $4,480•••2 each gas engine driven generating sets, to Sterling Mchy. Co., $818. Grand total $21,007. Bids Jan. 6, awarded Jan. 13.

†**TRAILERS — Los Angeles, Calif.** — U. S. Eng., 751 South Figueroa St., two or more 5 ton trailers, Proposal 348, to Moreland Motor Truck Co., 2325 South Main St., $5,958. Bids Jan. 10, awarded Jan. 13.

†**TRAILERS — Los Angeles, Calif.** — U. S. Eng., 751 South Figueroa St., two 6 ton trailers, to Utility Trailer Sales Co., 3723 South Alameda St., $2,032. Bids Jan. 10.

†**VIBRATORS, etc.—Los Angeles, Calif.**—U. S. Eng., 751 South Figueroa St., 3 each concrete vibrators, long flex shaft electrically operated, to Viber Co., 206 South Spring St., $1,225. Bids Dec. 31, awarded Jan. 3. Rejected bids Dec. 31, 2 gasoline driven generating sets.

WATTHOUR METER JEWEL BEARINGS, etc.—Los Angeles, Calif.—D. P. Nicklin, purch. agt. Dpt Water & Power, 207 South Broadway, synthetic sapphire watt hour meter jewel bearings, 17,000 bearings for G. E. Type 1-14 meters, 30,000 bearings for G. E. Type 1 meter, 19,000 lower bearings for Westinghouse Type AO meters, Spec. 1852, to Industrial Jewel Co., 3729 Avalon Blvd., $13,809. Bids Jan. 13, awarded Jan. 21. Noted Jan. 3, C. D.

WIRE ROPE — Los Angeles, Calif. — D. P. Nicklin, purch. agt. Dpt. Water & Power, 207 South Bway., furnishing 32,000 ft. 4 lengths, ¾ in. wire rope, 6/19 strand, hemp center, Spec. 1853, to Pacific Wire Rope Co., 1840 East 15th St., $3,360. Bids Jan. 8, awarded Jan. 16. Noted Jan. 16, C. D.

LIGHTING STANDARDS — San Francisco, Calif.—T. A. Brooks, city purch. agt., City Hall, ninety 20 ft. metal street lighting standards under Bid 1474, to Enterprise Fdry. Corp., 2902 19th St., $7,509. Bids Dec. 16, awarded Jan. 22. Noted Dec. 12, C. D.

★**STEEL RAILS — Chicago, Ill.** — Chicago, North Western Ry., C. T. Dike, ch. engr., 400 West Madison St., 16,000 tons steel rails, to Inland Steel Co., 48 South Dearborn St., about $600,000. Owner soon lets contract on fastenings, about $200,000.

STEEL RAILS—Chicago, Ill.—Illinois Central R. R. Co., A. F. Blaess, ch. engr., 135 East 11th Pl., Chicago, 3,000 tons steel rails, to Tennessee Coal, Iron & R. R. Co., Brown Marx Bldg., Birmingham, Ala.•••2,300 tons, to Carnegie Illinois Steel Co., Carnegie Bldg., Pittsburgh, Pa.•••2,300 tons, to Inland Steel Co., Chicago, Ill. Est. about $335,000. Will do work by day labor.

FIR LUMBER—Grundy Center, Ia.—Grundy Co., L. A. Meyer, aud., 31,350 ft. BM Class A Douglas fir, 4,417 ft. creosoted yellow pine, 15,600 ft. creosoted yellow pine and 2,140 ft. creosoted yellow pine piling, to Wheeler Lumber & Bridge Supply Co., 606 Hubbell Bldg., Des Moines, $3,777. Awarded Jan. 20.

YELLOW PINE PILING, etc.—Rock Rapids, Ia.—Lyon Co., T. D. McGuire, aud., 11,750 lin. ft. treated yellow pine piling; 137,500 lin. ft. BM treated fir lumber; 114,132 ft. untreated fir lumber, to C. M. Brown, Omaha, Neb., $16,873. Awarded Jan. 14.

†**PUMPS—Boston, Mass.**—Con. Q. M., 1st Corps Areas, Army Base, Boston, to Fairbanks Morse Co., Inc., 178 Atlantic Ave., Boston, deep well pumps for civilian conservation camps at Arcadia, Conn., $710; at Patten, Conn., $403; and at Upton, Mass., $325. Grand total $1,438. Bids Dec. 6, awarded Jan. 15.

GRANITE EDGESTONE — Salem, Mass. — City, D. W. Hamilton, purch. agt., City Hall, granite edgestone as required, to H. E. Fletcher Co., West Chelmsford, 7 in. straight at 83c. per ft., 7 in. circular at $1.15 per ft.; 8 in. straight at 95c. per ft., 8 in. circular at $1.38 per ft. Noted Jan. 20, C. D.

CHLORINATOR—East Grand Forks, Minn.—City, furnishing 1 chlorinator for city water plant, to Wallace & Tiernan Co., 11 Mill St., Belleville, Newark, N. J., $893 net. Bids Jan. 1, Noted Dec. 30, C. D.

†**INSULATOR HARDWARE, etc. — Boulder City, Nev.**—Bureau Reclamation, Denver, Colo., insulator and conductor hardware, to General Electric Co., 5201 Sante Fe Ave., Los Angeles, Calif., $5,607; special hardware, to Jeffery-DeWitt Ins. Co., Kenova, W. Va., $2,185. Bids Oct. 18.

LIQUID CHLORINE, etc. — New Brunswick, N. J.—City Comn., 20,000 lb. liquid chlorine, to Hoagland Drug Co., New Brunswick, 5.5c. lb.•••200 tons ferric sulphate, to Merrimac Chemical Co., Chemical Lane, Boston, Mass. $38 a net ton•••30 tons sulphate of aluminum to Charles Lennig & Co., New York, $1.85 per 100 lb.•••5,000 lb. liquid anhydrous ammonia, to Arnour & Co., New Brunswick, 14.5c. per lb. •••100 tons hydrated lime, to Grasselli Chemical Co., 350 Fifth Ave., New York, $11.175 per ton.

†**REINFORCING STEEL—New York, N. Y.**—Treas. Dpt. Procurement Div., 76 9th Ave., New York, 800 tons reinforcing steel, to W. Ames & Co., 417 Communipaw Ave., Jersey City, N. J.

FLAT DRAG BLADES, etc.—Raleigh, N. C.—Div. Purchase & Contract, A. S. Brower, dir., one thousand 8 ft. x 8 in. flat drag blades, to Peden Steel Co., 512 West Hargett St., Raleigh, $2,420; 4 pneumatic hand held rock drill, dry type, to E. F. Craven, Greensboro, $760. Noted Jan. 14, C.D. Bids Jan. 17.

UNLOADING EQUIPMENT—Georgetown, Pa.—Pittsburgh Coal Co., Oliver Bldg., Pittsburgh, designing and fabricating equipment to unload coal from barges to rail cars with capacity 500 tons per hr. for installing at owner's new docks at Georgetown, on Little Beaver River, to Dravo Contg. Co., Neville Island, Pittsburgh.

STEEL RAILS—Richmond, Va.—Southern Ry. Co., B. Herman, ch. engr., McPherson Sq., Wash., D. C., 3,000 tons steel rails, to Tennessee Coal, Iron & R.R. Co., Brown Marx Bldg., Birmingham, Ala., about $100,000.

†**STRUCTURAL STEEL, etc.—Madison, Wis.**—Treas. Dpt. at office Sup. Archt., Wash., D. C., structural steel and iron works for equipment storage building, to Milwaukee Structural Steel Co., 4122 West State St., Milwaukee, $1,400 and $354 respectively. Bids Jan. 13, awarded Jan. 13.

†**CULVERTS, etc.—Milwaukee, Wis.**—U. S. Forest Service, F. H. Carroll, purch. agt., furnishing 150 culverts and 18 bands, to Wheeling Corrugated Co., 1000 Spruce St., St. Louis, Mo., $2,707. Bids Dec. 18, awarded Jan. 14.

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Materials, etc. (Continued)

†**ROAD RIPPERS**, etc.—**Milwaukee, Wis.**—U. S. Forest Service, 2 road rippers, to Hunter Tractor & Mchy. Co., 327 South 16th St., Milwaukee, $1,166•••68 fire extinguishers, to Peerless Mfg. Co., 53 West Jackson Blvd., Chicago, Ill., $357•••overhead irrigation system, to White Showers, Inc., 6451 Dubois St., Detroit, Mich., $423•••200 mi. copper covered wire, to General Cable Co., 20 West Wacker St., Chicago, Ill., $3,222•••galvanized wire, to Automatic Electric Sales Co., 1033 West Van Buren St., Chicago, Ill., $256•••telephone equipment, to Westinghouse Electric Supply Co., Inc., 546 Bway., $190•••19,125 lb. galvanized wire, to Frankfurth Hardware Co., 521 North Plankington Ave., $1,133•••5 air compressors, to Dayton Air Compressor Co., 427 Villez St., Dayton, O., $428. Grand total $7,175. Awarded Jan. 20.

FOREIGN

Australia—Brisbane City Electric Light Co. Ltd., bids until March 10, supplying 11,000 volt and 415 volt switchgear•••State Electric Commission of Victoria, **Melbourne**, in market for 3 phase, 50 cycle oil insulated outdoor automatic induction voltage regulators, complete with all accessories, cable tenders not later than Feb. 17.

China, Tientsin—Hen Tung Trading Co. Ltd., 83 Rue du Baron Gros, in market for supply iron and steel piping, galvanized and ungalvanized, all sizes and type for usual commercial purposes.

Colombia, Barranquilla—Companie Nacional de Maderas prepares plans constructing veneer and plywood plant and in market for equipment.

Denmark, Copenhagen—Government voted to construct 5 kilom. bridge over Great Belt from Isle of Amager, Denmark to Limhamn, Sweden. **Maturity in summer.**

Egypt, Cairo—Ministry of Public Wks., bids in February, constructing railway from Fouka to Mersa Matruh. $570,000 appropriated.

England—British Government, **London**, plans improving railroads and highways, incl. electrification of track, new stations, automatic train controls, and general modernization of equipment on Great Western Ry., London, Midland and Scottish Ry., London & Northwestern Ry. and Southern Ry.; also improving roads throughout the country. $650,000,000. Direct government grants will match the local funds.

England — Chichester Municipality making plans constructing town hall and sewerage works, $500,000•••Essex Education Committee, **Chelmsford,** schools at Chadwell Heath Warren, Great Burstead, Little Thurrock and South Hornchurch, to Hosking & Sons, Essex, Ltd., Raleigh, $491,235; also votes school construction at Chelmsford, Earl's Colne, Loughton, Brentwood, and North Chingford, $549,660••• Public Assistance Committee, Essex Court, Chelmsford, takes bids Feb. 15, supplying, installing engineering plant at **Hornchurch,** also boiler house, pumping house plant, heating and hot water service, in buildings and mains in subways, J. Stuart, Chelmsford, archt.••• H. Wood, clk Councils Office, **Tilbury,** taking bids supplying and installing Weighbridge having platform of not less than 16 ft. long with carrying capacity of not less than 20 tons; River Wear Commissioners, **Sunderland,** votes for reclamation of 60 acres, $1,750,000••• Stourport Gas Co., **Stourport,** plans extending plant and mains•••H. Bailey Chapman, Town Hall, **Burton-upon-Trent,** taking bids constructing refuse destructor and salvage plant to deal with 75 tons refuse per day•••J. R. A. Jones, clk., Council House, **Dunmow,** taking bids supplying and delivering 120,600 ft. spun iron pipes.

England—Welton Rural Dist. Council, **Lincoln,** invites tenders for supplying and laying 310,-528 lin.ft. 3- to 8-in. c.i. or steel water pipe, erecting pumping station, supplying pumping machinery, incl. 2 horizontal electric motors, each 30 hp. and 2 directed coupled turbine type centrifugal pumps each of 125,000 gal. per hr. capacity, constructing 150,000 gal. rein.-con. reservoir, and 16,000 gal. steel water tank. Elliott & Brown, Counties Bldg., Nottingham, engrs.•••City Engineer Guildhall, **Bath,** asks contractors to send names as soon as possible who wish to bid on construction steel plate girder Victoria Bridge and rein.-con., stone North Parade Bridge•••Prudential Assurance Co., Ltd., **Bournemoth,** constructing 200 residences on Bath Rd., to Trollope & Colls, Ltd., 5 Coleman St., E. C., London, $600,000••• **Gateshead** Municipality, 572 houses, Dexham Hall, to J. Clarke & Son, Ltd., Gregson Terrace, New Seaham, $744,480•••**Ipswich** Municipality, 264 houses, to J. Jerrard & Son, Ltd., Swinton, $601,445•••**Nottingham** Municipality, 1,385 houses at Bestwood, to J. W. Stamp & Co., Ltd., Nuthall Rd., $2,500,000, E. Phillips, Exchange Bldg., archt.•••**Stoke-on-Trent,** J. W. Jones, plans by F. R. Lawson, 36 Glebe St., 540 houses at Wolstanton, $1,000,000•••Taylor & Whittaker, Ltd., Knutsford Rd., **Wilmslaw,** prepares plans 200 houses at Fulshaw Park, $540,-000•••Silver Houses, Hillington Lt., **Wealdstone,** prepares plans 400 house construction, $710,000•••Rickmansworth & Uxbridge Valley Water Co., Ltd., **Uxbridge,** prepares plans extension during 1936, $2,500,000•••**Maidenhead** Municipality taking bids for bridge at Bray, $500,000•••**Rochdale** Municipality constructing 232 houses at Brotherhood Hall, to T. Wilkinson & Son, Ltd., Rochdale Rd., $531,000••• **Sheffield** Municipality, 332 houses, to M. J. Gleeson & Co., Ltd., 822 Chesterfield Rd., $513,-630•••**Poulton le-Fylde** Urban District Council taking bids constructing storage reservoir and 12¼ mi. sewers•••**Buckingham** City Engineer taking bids mass concrete construction 200,000 gal. reservoir and supplying and laying 3 mi. 7 in. pumping and distribution mains•••D. A. Davis, clk. Urban District Council, **Abertillary,** invites contractors to submit schemes and competitive tenders for supplying, delivering and erecting filtration and chlorination plant••• J. D. and D. M. Watson, engrs., Westminster, London, preparing plans reconstructing Camels Head sewerage pumping works, **Plymouth,** $600,000•••Cellon Ltd., 88 Queen Victoria St., E. C., **London,** plans plant extensions, $425,000 •••Ministry of Industry, **London,** preparing plans locomotive experimental station for testing performance of railway engines, $600,000••• Sutton, Swelling Trust, Victoria House, Southampton Row, W. C., **London,** constructing residences at Pendleton, to Kettlewell Son & Co., Ltd., 11 Colonial St., Hull, $600,000•••Central Electricity Bd., Trafalger Bldg., Charring Cross, invites tenders for supplying materials and constructing 132,000 volt overhead transmission lines, **London**•••Sutton Dwelling Trust, Victoria House, Southampton Row, W. C., **London,** plans by C. E. Errington, Grainger St., Newcastle-on-Tyne, 350 flats at Sundeland, $625,000••• S. G. S. Young, secy., **Bombay, Baroda & Central, India Railway,** The White Mansions, 91, Petty France, Westminister, S. W., **London,** taking bids for supply of year's requirements of steel materials, plates, angles, rounds, etc.••• E. A. S. Bell, managing director of South Indian Railway Co., **London,** taking bids year's requirements of copper ingots and helical and volute springs, address W. Bell, 91 Petty France, Westminister, S. W.

England, Birmingham — Morris Commercial Cars Ltd., Birmingham, plans plant addition. $1,200,000.

England, London—North Metropolitan Electric Power Co. plans extensive program during 1936, $3,000,000•••Great Western Railway plans reconstructing 50 bridges and renewal of 406 mi. line•••London and North Eastern Ry., constructing additional docks at Frimsey and Hull, $3,500,000•••G. F. Stringer, clk. Metropolitan Water Bd., 173 Roseberry Ave. E.C., takes bids Feb. 25, supplying and erecting 8 steam turbines with centrifugal pumps at Hampton Station.

England, London—F. C. Bovenschen, dir. of Army Contracts, Caxton House, Tothill St., Westminster, S.W. London, will list names until Feb. 16, for firms not already in the war office list who desire to be invited to tender for supplies during 1936, for aluminum ingot and castings, brass, brass rod and sheet, bronze castings, copper ingot and sheet, lead pig and sheet, nickel, pig iron, steel plate, tin ingot, tinned brass pressings and stampings, zinc ingot and sheets, building materials and fitments, machinery, reinforcing metal, steel, c.i. pipe, tools, wire, wire rope, cables, electric plant, scientific and optical instruments, heating and electrical installations, erecting steel work, road materials, paints and varnishes, shellac and timber.

Germany, Hamburg—John Peemoller, Raboisen 8, in market for Douglas fir veneer logs, standard Custom duty of R.M. 3.34 per cu. metre should be included in tendering price.

India, Bombay—H. A. Sheares, Ltd., Amrut Bldg., Ballard Estate, in market for 1 ton aluminum powder (dry), 25 tons red lead (dry), in casks or paper lined double bags; 25 tons white lead (dry) Cables "Quicksales," Bombay.

Irish Free State, Dublin—Electricity Supply Bd., 37 Merrion Sq., invites tenders for supply of year's requirment power transformers.

Mexico—Mar. 31, by R. J. Zevada, director general de Credito, and E. Suarez, secy. de Hacinda at National Palace, Mexico City, for irrigation work, 3 concrete dams, one at La Angostura on Bavispi River, State of Sonora; 1 on El Palmito, Naxas River, State of Durango; one at Comales de Airrba, San Juan River, State Tamaulipas. Plans and specifications available Jan. 1. Price 100 pesos.

Mexico — Federal Government, Mexico City, soon lets contract roads, incl. grading, surfacing, bridges, on road from Matamoros to Victoria. 5,000,000 pesos.

Mexico—National Railways of Mexico, Mexico City, plans rebuilding railway between Matamoros and Monterrey, incl. grading, bridging, heavy steel, electrical equipment, ties, stations, etc. 5,000,000 pesos.

Mexico, Matamoros—City, R. Garvis, mayor, plans waterworks system, public parks, airport, miscellaneous improvements, playgrounds, repair shop, et 1,000,000. Interested contractors and dealers should communicate with owners.

Mexico, Tampico—National Railways of Mexico, Tampico, constructing freight and passenger terminal, separate contracts awarded. $500,-000 or more.

New Zealand—Mar. 11, by Director Supplies, Posts & Telegraphs Dpt., **Wellington,** supplying 100 mi. insulated bronze wire in 440 yd. lengths•••New Zealand Breweries, Ltd., Bunny St., **Wellington,** plans by Atkin & Mitchell, archts., constructing 7 story, 80x135 ft., steel, concrete hotel. $550,000•••New Zealand Oil Fields, Ltd., Melbourne, C. Fraser, genl. mgr., announces 1936 development, **Taranaki,** $1,000,000•••Stannifer Tin Lode, Ltd., **Sydney,** in market for dredge, 50,000 cu.yd. capacity.

Norway—Corporation, c/o Krupp Industries, **Essen, Germany,** or c/o Henry Man, Brown Bros., Harriman & Co., London, England, constructing tool steel works, 30,000 tons annual capacity. To exceed $500,000.

Scotland—Hamilton Municipality voted to construct 300 homes, $600,000•••Crossley & Blackwell, Ltd., **Peterhead,** prepares plans fire served provision factory and fish curing kilns at Embankment Rd.

South Africa, Cape Town—I. Sedgewick & Co., Ltd., P. O. Box 68, in market for automatic bottle washing machinery, capable of washing bottles of at least 4 different sizes and shapes. Custom duty 5% ad valorem. Cables "Sedgewick," Capetown.

Uruguay, Montevideo—Feb. 17, by State Electric Supplies & Telegraph Administration, supplying 78,000 kg. bare copper wire and 41,000 kg. bare copper cable; Feb. 10, for supplying three 200 kva. 3 phase, step up transformers, one 50 kva. 3 phase, step down, three 20 kva. 3 phase, step down, 9 single phase potential and 9 current.

Wales, Cardiff—North Wales Electric Power Co. Ltd., prepares plans extension program, $3,000,000.

Wales, Ebb-Vale—Richard Thomas & Co. Ltd., London, England, continuous sheet rolling mills, separate contracts now being awarded for American equipment under patents of American Rolling Mills Co., Middletown, O. $5,000,000.

PUBLIC BUILDINGS

PROPOSED WORK

Calif., Berkeley—Berkeley City School Dist. plans general reconstruction and additions for Lincoln School, $150,000. T. Chase, 605 Market St., San Francisco, engr.

Calif., Los Angeles—Bd. Educ. plans by A. F. Rosenheim, 1151 South Broadway, boy's physical education building, new administration building and shop building at Hollenbeck Junior High School, 602 South Soto St. $380,-000. P.W.A. project.

Calif., Los Angeles—Los Angeles Bd. Educ., Chamber of Commerce Bldg., plans by Morgan, Walls, Clements, 1135 Van Nuys Bldg., School auditorium and additions and alterations to mechanical arts building, Units 1 and 2, and mechanical drawing building at Thomas Jefferson High School, 1319 East 38th St. $153,000. P.W.A. project.

Calif., Los Angeles—Los Angeles Bd. Educ. plans by Hibbard, Gerity & Kerton, 1106 Architects Bldg., reconstructing, rehabilitating and strengthening main building at Theodore Roosevelt High School, 450 South Fickett St. $192,000. O. G. Bowen, 144 South Grand Ave., engr.

Calif., Los Angeles—Los Angeles Bd. Educ., Chamber of Commerce Bldg., plans by R. J. Neutra, 2348 Silver Lake Blvd., Los Angeles, new buildings to be erected at Ralph Waldo Emerson Jr. High School, 1650 Selby Ave., West Los Angeles. $195,000.

Calif., Santa Ana — Santa Ana Bd. Educ. plans by Allison & Allison, 1014 Edison Bldg., Los Angeles, 2 story, classroom building Unit B, a shop building Unit C, and 1 story, 9 room building Unit E. Total est. $198,000. Application made for P.W.A. grant of $100,350 for project.

Calif., San Pedro — Los Angeles Bd. Educ. plans by G. B. Kaufmann, 627 South Carondelet St., Los Angeles, school auditorium at San Pedro High School, 1221 South Gaffey St. $195,-000.

★ †**Calif., Sawtelle**—Veterans Administration Facility, Wash., D. C., making plans constructing neuro-psychiatric patients' hospital, 305 bed barracks for men and 50 bed barracks for women, at U. S. Veterans Hospital. $835,-000. Noted Aug. 7, C. D.—Aug. 15, E. N.-R.

Calif., South Gate — Los Angeles Bd. Educ. plans by Gilbert Stanley Underwood, 1400-04 Continental Bldg., Los Angeles, physical education building, auditorium and new classroom building at Southgate High School, 3351 Firestone Blvd. $181,000.

Conn., Stonington—Town, School Bd. will not construct brick, steel high school. $456,000. Project abandoned. Noted Nov. 20, C. D.—Nov. 28, E. N.-R.

★ **Florida**—Florida Tuberculosis Bd., W. T. Edwards, chn., Jacksonville, plans constructing T.B. Sanatorium. $600,000.

Ill., Jacksonville—City voted $231,000 municipal light and power plant. $420,000. $189,000 allotted by P.W.A.

★ **Ill., LaSalle**—City making final plans constructing steam power plant. $750,000. Burns & McDonnell Eng. Co., 107 West Linwood Blvd., Kansas City, Mo., engrs. Noted Sept. 30, C. D.—Oct. 3, E. N.-R.

Ill., Petersburg—City plans municipal power plant, and distribution system. $140,000 loan and grant allotted by P.W.A.

Ind., Elkhart — Bd. Educ. plans rebuilding school. $140,000 or more. Architect not appointed.

†**Ind., Gary**—Treas. Dpt. at office Sup. Archt., Wash., D. C., plans by H. L. Cheney, 208 South LaSalle St., Chicago, Ill., 2 story, basement.

†*Federal Government.*

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Public Buildings (Continued)

125x177 ft. post office, 6th St. and Massachusetts Ave. $283,000.

Ind., **Kouts**—Pleasant Twp., A. Honehouse, twp. trustees, soon takes new bids on revised plans constructing 2 story, basement high school. $167,000. P.W.A. project. C. E. Miller, 210 Union Trust Bldg., South Bend, archt. Noted Jan. 8, C. D.—Nov. 28, E. N.-R.

La., **Natchitoches**—Louisiana State Normal College plans by Weiss, Dreyfous & Seiferth, Maison Blanche Bldg., New Orleans, new buildings, new library, est. $150,000, and new power plant. Total est. $285,000.

La., **Ruston**—Louisiana Technical College plans constructing administration building. Est. about $300,000. Architect not appointed.

Mass., **Greenfield**—Town, T. M. Hayes, chn. School Bd., 3 Bank Row, voted not to build Junior High School, Shattuck Park. $414,000. P.W.A. project. B. Dirks, 278 Main St., archt.

Mass., **Lee**—Town, Bd. Selectmen, Town Hall, plans by M. W. Maloney, 220 Dwight St., Springfield, 2 story, basement, 130x138 ft., brick, steel, marble, high school addition, concrete found. $125,000 or more. P.W.A. project.

Mass., **Lowell**—City, D. G. Archambault, City Hall, plans by H. P. Graves, 40 Middlesex St., 2 story, basement police station. To exceed $140,000.

Mass., **Lowell**—Lowell General Hospital, 339 Varnum Ave., Lowell, sketches by Appleton & Stearns, 53 State St., Boston, hospital addition. To exceed $140,000. **Maturity indefinite.**

★ †**Mo., Kansas City**—Treas. Dpt. at office Sup. Archt., Wash., D. C., sketches by Wight & Wight, 400 1st Natl. Bank Bldg., constructing U. S. Federal Court House, 9th and Grand Sts. $3,200,000. Noted Sept. 10, C. D.—Sept. 12, E. N.-R.

†**Neb., Omaha** — Treas. Dpt. at office Sup. Archt., Wash., D. C., soon takes new bids on revised plans remodeling federal building, post office and court house, 16th and Dodge Sts. $225,000. Bids Oct. 23 rejected. Noted Oct. 28, C. D.—Oct. 10, E. N.-R.

N. Y., **Farmingdale**—State Dpt. Educ., Education Bldg., Albany, soon takes bids constructing dormitory and mess hall, for State Institute of Applied Agriculture. $245,000. W. H. Haugaard, State Office Bldg., Albany, archt. Noted Nov. 8, C. D.—Nov. 14, E. N.-R.

★ N. Y., **Newark**—Bd. Educ. bids in spring, brick, steel school, plain found., $500,000. C. C. Ade, 80 East Ave., Rochester, archt.

N. Y., **New York**—College of City of New York, Convent Ave. and St. Nicholas Terrace, plans constructing 90 ft. pedestrian and service tunnel connecting college buildings at Convent Ave. and St. Nicholas Terrace. $100,000. H. G. Bohlin, 43 West 83rd St., engr.

★ N. Y., **Stamford**—Bd. Educ., Central School Dist., J. A. Tooley, pres., plans by H. O. Fullerton, 152 Washington St., Albany, constructing school. $500,000. P.W.A. project. Noted Nov. 14, C. D.—Nov. 21. E. N.-R.

N. D., **Mandan**—City rejected P.W.A. allotment for constructing municipal power plant and distribution system. Project abandoned. $336,000. E. R. Griffin, city engr. Noted Jan. 20, C. D.—Jan. 23, E. N.-R.

★ †**O., Mount Healthy**—Resettlement Administration, Wash., D. C., plans housing project for 1,500 families, incl. streets, sewers, etc. $10,000,000. A. Miller, c/o owner, engr.

★ **Pennsylvania**—Commonwealth of Pennsylvania, Dpt. Property & Supplies, Harrisburg, A. Colegrove, secy., bids early in Spring for construction of garages and shops for Hy. Dpt. in Allentown, New Castle, Greensburg, Carlisle and Bedford. P.W.A. project. $500,000.

Pa., **Dunmore**—Boro plans new boro hall and bituminous macadam paving of various streets. $300,000. S. Mastriani, boro engr.

Pa., **Titusville**—See "Unclassified."

R. I., **Howard** (Cranston)—State, Emergency P. Wks. Comn., State House, Providence, rejected bids Dec. 27, remodeling 2 story, basement, "C" building at Mental Hospital. A. M. Humes, 332 Main St., Pawtucket, archt. New bids Jan. 28. Noted Jan. 24, C. D.—Jan. 9, E. N.-R.

R. I., **Howard** (Cranston)—State, Public Welfare Comn., State House, refiguring bids for 1 story, basement, 35x70 ft., brick canning plant. P.W.A. project. C. H. Lockwood, 171 Westminster St., Providence, archt. Noted Jan. 14, C. D.—Jan. 16. E. N.-R.

Tex., **Galveston**—John Sealy Hospital, Galveston, (State Psychopathic Hospital), soon takes bids brick, rein.-con. hospital unit for crippled children, plain found. $200,000. P.W.A. project.

Tex., **Hillsboro**—P. Shipley, judge Hill Co., defeated bonds and postponed opening bids for court house and jail remodeling and construction work. $110,000. P.W.A. project. Voelcker & Dixon, 913½ Indiana Ave., Wichita Falls, archt. Noted Dec. 30, C. D.—Oct. 24, E. N.-R.

Wash., Everett — School Dist. plans auditorium-gymnasium, on Colby Ave. $150,000. P.W.A. funds to be asked. E. W. Morrison, Textile Tower, archt.

Man., **Winnipeg**—Winnipeg School Bd., W. A. Cuddy, acting chn., making plans constructing Central Technical Institute. $150,000.

Ontario—Hydro-Electric Power Comn., R. T. Jeffrey, engr., 620 University Ave., Toronto, plans hydro-power plant to supply mines in Rat Rapids, on Albany River, 100 mi. north of Sioux Lookout. Patricia Dist., and soon takes bids for machinery and equipment. Work likely to be done by day labor under supervision of owners' staff. $300,000.

P. E. I., Charlottetown—See "Unclassified."

†*Federal Government.*

BIDS ASKED

Alabama—Feb. 5, by University of Alabama at office of S. C. Houser, treas., chemical engineering wing addition to chemistry building, consisting of general work, plumbing, heating and electrical work. Warren, Knight & Davis, 700 Protective Life Bldg., Birmingham, archts.

Calif., Salinas—Supervs. Monterey Co., bids about Feb. 10, 3 story, rein.-con. court house, $350,000. C. Butner, 51 Maple St., Salinas, and R. Stanton, Carmel, archts. R. Ware, 51 Maple St., Salinas, engr.

Colo., Golden — Feb. 5, by School Bd., 3 story, basement, brick, steel joists school, concrete found. $175,000. E. Groves, 2047 Champa St., Denver, archt.

†**Ill., Galesburg**—Feb. 21, by Treas. Dpt. at office Sup. Archt., Wash., D. C., 1 story, basement, 100x115 ft., brick, steel U. S. Post Office, plain found., East Main and Chambers Sts. $162,000. Aldrich & Aldrich, 700 Bondi Bldg., archts. Noted Mar. 13, C. D.—Mar. 21, E. N.-R.

Ind., Fort Wayne—Feb. 12, by Bd. P. Wks., R. G. Beams, chn., City Hall, 1 story, light and power plant addition; boiler house addition, $65,660; also furnishing, erecting cell structure and 13,800 volt bus wiring and circuit breaker. Total est. $145,000. P.W.A. project. Froehlich & Emery, Sec. Natl. Bank Bldg., Toledo, O., engrs. Noted Sept. 3, C. D.—Sept. 5, E. N.-R.

†**Ind., Indianapolis**—Feb. 14 (extended date), by Treas. Dpt. at office Sup. Archt., Wash., D. C., extending and remodeling U. S. Post Office. Noted Dec. 30, C. D.—Jan. 2, E. N.-R.

La., Natchitoches — Feb. 15, by Louisiana State Bd. Educ., Baton Rouge, steam and electric power generating plant, steam and electric mains, conduits, parkway lighting, etc., and constructing library building, at Louisiana State Normal College. $285,000. Weiss, Dreyfous & Seiferth, Maison Blanche Bldg., New Orleans, archts. Noted Jan. 16, C. D.

Mass., Waltham—Feb. 4 (extended date), by Comrs. Middlesex Co., W. C. Wardwell, chn. Court House, East Cambridge, ward building, surgical wing and dining room at County Hospital. Jas H. Ritchie & Associates, 100 Arlington St., Boston, archts. Noted Jan. 14, C. D.—Jan. 16, E. N.-R.

Mo., Fulton—Feb. 13, by State Hospital 1, and Bi-Partisan Advisory Bd. State Building Comn., E. M. Eagan, executive secy., Jefferson City, general contract two 4 story, basement, 50x140 ft. ward buildings. $288,000. P.W.A. project. Hoener, Baum & Froese, Inc., 3605 Laclede Ave., St. Louis, archts. Noted Sept. 11, C. D.—Sept. 19, E. N.-R.

Mo., Koch—Feb. 25, by Bd. P. Service, City Hall, general contract 3 story, basement, 65x 162 ft., rein.-con. brick, stone addition to negro tubercular patients' building. $300,000. W. C. E. Becker, city engr. A. Osburg, city archt. Noted Jan. 6, C. D.—Jan. 9, E. N.-R.

★ **N. Y., Binghamton**—Bd. Educ., Binghamton, bids about Feb. 15, constructing school, Howard Ave. $800,000. P.W.A. project. L. J. Kaley, Court St., archt. Ball & Snyder, 101 West 4th St., New York, engrs.

N. Y., Brooklyn—Feb. 4, by W. C. Martin, archt. and supt. School Buildings, Flatbush Ave. extension and Concord St., Brooklyn, general contract P. S. 239, Neptune Ave., West 24th to 26th Sts., for Bd. Educ., 500 Park Ave., New York.

N. Y., Flushing—See "Contracts Awarded."

N. Y., Holland Patent—Feb. 15, by Central Rural School Dist., 1, general contract constructing school. $425,000. Kinne & Frank, 7 Hopper St., Utica, archts. P.W.A. project. Foundations awarded to Bedford Constr. Co., 1300 Broad St., Utica. $32,781. Noted Nov. 18, C. D.

N. Y., Johnson City—Bd. Educ., Johnson City, bids about Feb. 15, school. W. Whitlock, 607 Chenango St., Binghamton, archt. $285,000. Noted Jan. 10, C. D.—Jan. 16, E. N.-R.

N. Y., Keesville — Central School Dist. 1, Keesville, bids about Feb. 15, constructing school. $280,000. P.W.A. project. A. W. Inman, 71 Clinton St., Plattsburg, archt.

N. Y., Laurelton—See "Contracts Awarded."

N. Y., Little Neck—See "Contracts Awarded."

N. Y., Morrisville—Feb. 6, by Central School Dist. 1, G. Phelps, clk., grading, excavation and sewage disposal system for school. $172,000. P.W.A. project. Bids later for superstructure. G. W. Clark, 27 North Main St., Cortland, archt. Noted Oct. 18, C. D.—Oct. 24, E. N.-R.

N. Y., New York—See "Contracts Awarded."

†**N. Y., New York**—Feb. 20, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing freight elevator in "D" annex, Postal Station.

N. Y., Philadelphia—Union School Dist. 3, bids about Feb. 1, constructing superstructure for school, Sand St. $125,000. P.W.A. project. D. D. Kieff, Chamber of Commerce Bldg., Watertown, archt. Noted Jan. 6, C. D.—Jan. 9, E. N.-R., under "Contracts Awarded."

†**N. D., Grand Forks**—Feb. 14, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing elevator plant in U. S. Post Office, Court House extension and remodeling.

O., New Miami—Feb. 10, by Fay Davish, clk. Bd. Educ., constructing 2 story, basement, 131x163 ft., brick, concrete school. $197,795. P.W.A. project. Noted Jan. 7, C. D.—Jan. 9, E. N.-R.

†**Pa., Coatesville**—Mar. 3, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing infirmary and acute building for Veterans Hospital. Noted Aug. 28, C.D.—Sept. 5, E.N.-R.

†**S. D., Lemmon**—Feb. 26, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $72,000.

†**Tenn., Knoxville**—Feb. 7, by Tennessee Valley Authority, Knoxville, furnishing, fabricating, painting and installing automatic elevator in Norris Power Plant, incl. appurtenances. C. H. Garity, dir. Purchases.

†**Tenn., Nashville**—Feb. 11, by Treas. Dpt. at office Sup. Archt., Wash., D. C., remodeling elevator plant in U. S. Post Office and Court House.

†**Tex., Baytown**—Feb. 12 (extended date), by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing 1 story, 49x83 ft. post office, $68,000. Noted Jan. 9, C. D.—Jan. 16, E. N.-R.

★ †**Tex., Dallas**—Feb. 17 (extended date), by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Parcel Post Office. $700,000. Noted Jan. 16, C. D.—Jan. 23, E. N.-R.

†**Tex., Houston**—Feb. 13, by Treas. Dpt. at office Sup. Archt., Wash., D. C., freight elevators in U. S. Parcel Post Building.

†**Tex., Laredo** — Feb. 20, by Treas. Dpt. at office Sup. Archt., Wash., D. C., extending and remodeling U. S. Post Office, Court House and Custom House. $340,000. Noted Dec. 5, C. D.—Dec. 12, E. N.-R.

Wash., Yakima—Feb. 17, by School Bd., B. F. Kumler, secy., constructing 72x153 ft. auditorium, balcony, basement, rein.-con., incl. ventilating equipment, classroom unit and library. $140,000. J. W. Maloney, Larson Bldg., archt. Noted Jan. 20, C. D.—Jan. 23, E. N.-R.

†**Wis., Kaukauna**—Feb. 11, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. $67,500. Noted Dec. 5, C. D.—Dec. 12, E. N.-R.

CONTRACTS AWARDED

†**Ala., Tuskegee**—Vet. Bu., Arlington Bldg., Wash., D. C., constructing continued treatment building at U. S. Veterans Hospital, to Pittman Constr. Co., Rhodes Bldg., Atlanta, Ga., $287,993. Rejected bids Jan. 7, elevators in above building. Bids Jan. 7. Noted Jan. 13, C.D.—Dec. 12, E.N.-R.

†**Arizona and California** — Bureau Reclamation, Dpt. Interior, Yuma, Ariz., constructing 28 camp buildings at site of Imperial Dam Desilting Works. All American Canal System, to H. Lackhart & G. Hall, 435 H. W. Hellman Bldg., Los Angeles, Calif. $41,500. Bids Jan. 3.

Calif., Centerville—C. N. Swenson, general contractor, 355 Stockton Ave., San Jose, reinforcing steel for school reconstruction for Washington Union High School Dist., to McGrath Steel Co., 354 Hobart St., Oakland•••structural steel, to Schrader Iron Wks., 1247 Harrison St., San Francisco•••lumber, to Hansen Lumber Co., Centerville. Noted Jan. 3, C.D.—Jan. 9, E.N.-R., under "Contracts Awarded."

Calif., Clarksburg—Azevedo Constr. Co., general contractors, 920 "O" St., Sacramento, electrical work for high school addition, to J. C. Hobrecht, 1020 J St., for Clarksburg Union High School Dist.•••plumbing, to Luppen & Hawley, 3120 "J" St.•••heating, to M. R. Carpenter, 907 Front St.•••sheet metal, to McLaughlin Sheet Metal Co., 1914 "I" St.•••painting, to Willcoxon & Wilson, 1724 34th St.•••reinforcing steel, to H. Weaver, 3909 Miller Way, all contractors Sacramento. Noted Jan. 6, C.D.—Jan. 9, E.N.-R., under "Contracts Awarded."

Calif., Sacramento—W. C. Keating, general contractors, 1121 24th St., plumbing for Junior College Library, to Hately & Hately, 1710 10th St.•••electrical work, to G. C. Foss, 1720 8th St.•••heating, to M. R. Carpenter, 907 Front St.•••sheet metal, to Wagner Sheet Metal Wks., 2900 M St.•••iron work and structural steel, to Palm Iron Wks., P. O. Box 746•••painting, to Willcoxon & Wilson, 1724 34th St.•••reinforcing steel, to Truscon Steel Co., 604 Mission St., San Francisco. Noted Jan. 14, C.D.—Jan. 16, E.N.-R., under "Contracts Awarded."

Calif., Salinas—P. T. Wallstrum, Watsonville, general contractor, heating and plumbing for tubercular hospital for Supervs. Monterey Co., to Phillips Plumbing & Heating Co., Salinas••• electrical work, to Rodeo Electric Co., Salinas •••painting, to G. Ayers, Salinas•••reinforcing steel, to San Jose Steel Co., San Jose•••structural steel, to Berkeley Steel Constr. Co., 2nd and Camelia Sts., Berkeley. **P.W.A.** Noted Jan. 15, C.D.—Jan. 23, E.N.-R., under "Contracts Awarded."

Calif., San Francisco—Dpt. P. Wks., City Hall, general contract rein.-con. grammer school (Agassiz School), to Anderson & Ringrose, 320 Market St., San Francisco, $132,000 with alternates. **P.W.A.** Bids Dec. 27, awarded Jan. 16. Noted Jan. 7, C.D.—Nov. 14, E.N.-R.

Calif., Stockton—City Port Comn., six one story brick warehouses, to O. H. Chain, 41 South Sutter St., $185,297. Bids Dec. 30, awarded Jan. 15. Noted Jan. 10, C.D.

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Public Buildings (Continued)

Calif., Tulare—Trustees Tulare High School Dist., general contract on all units for 2 schools, gymnasium, to Midstate Constr. Co. and W. J. Ochs, Power Bldg., Fresno, $154,103*** plumbing, to Scott Co., 243 Minna St., San Francisco, $22,254***electrical work, to American Electric Constr. Co., 462 Bryant St., San Francisco, $16,245. Grand total $192,602 **P.W.A.** Bids Jan. 10. Noted Jan. 21, C. D.—Oct. 31, E. N.-R.

Calif., Walnut Grove — Peterson & Steinbrenner, general contractors, Sacramento, electric work for school, for Walnut Grove School Dist., to Reliable Elevator Wks., 619 California St., Sacramento***plumbing and heating, to Luppen & Hawley, 3126 J St., Sacramento*** sheet metal, to F. Zahl, 1615 21st St., Sacramento. Noted Jan. 6, C. D.—Jan. 9, E. N.-R., under "Contracts Awarded."

Colo., Alamosa—W. N. Bowman, archt., Insurance Bldg., Denver, constructing 2 story, 76x 127 ft. men's dormitory and 2 and 3 story, 84x 172 ft. women's dormitory, at Adams State Normal School, for State, to A. C. Larsen, Broomfield, $179,827. Bids Dec. 27. **P.W.A.** Noted Jan 16, C. D.

Conn, East Hartford (br. Hartford) — G. Cudemo, Inc., general contractors, 983 Main St., Hartford, electrical work for 2 story, basement, 60x60 ft., and 50x100 ft. town hall, to Bauer & Co., Inc., 440 Asylum St., Hartford, for Town, Bd. Selectmen***painting, to P. Sarges, 32 Goodrich St., Hartford***tile, marble, slate, terrazzo, to Central Marble & Tile Co., 56 Sanford St., Hartford***millwork, to Builders Finish Co., 34 Potter St. Noted Jan. 9, C. D.—Jan. 16, E. N.-R., under "Contracts Awarded."

Conn., Guilford—E. and F. Constr. Co., general contractors, 94 Wells St., Bridgeport, steel erection for high school, for Town, School Bd., to Conn. Steel Erect. Co., 67 Church St., New Haven***heating and plumbing, to Ideal P. and H. Co., 208 Meadow St., New Haven*** reinforcing steel, to Truscon Steel Co., 1315 Albert St. Ext., Youngstown, O.***structural steel, to Connecticut Steel Erecting Co., 67 Church St., New Haven***limestone, to Harding & Cogswell, Inc., Bloomington, Ind. Noted Jan. 9, C. D.—Jan. 16, E. N.-R.

Conn., New Britain—City, J. M. Ward, chn. Bd. Educ., constructing brick, steel Junior High School, Goodwin St., to Michael A. Connor Co., 561 Main St., Hartford, $143,159***heating and plumbing, to C. N. Flagg & Co., Inc., Griswold St., Meridian, $30,950***electrical work, to Perry Electric Co., 327 Trumbull St., Hartford, $7,784. Grand total $141,893. **P.W.A.**

Conn., West Hartford (br. Hartford)—Industrial Constr. Co., general contractors, 721 Main St., Hartford, iron for brick, marble, steel town hall, for Town, R. L. Loomis, mgr., to Bradley & Hubbard Mfg. Co., Hanover St., Meriden ***slate, tile, marble, terrazzo, to Central Marble & Tile Co., 56 Sanford St., Hartford ***granite, to Perry Bros., Church St., New Haven***reinforcing steel, to Topper & Griggs, 200 North Main St.***roofing, sheet metal, to E. Dansky, 22 Raymond St.***metal toilet partitions, to R. V. Thomas, 16 Sequin St., New Britain***heating, to W. B. Carson, Inc., 220 Sargeant St., Hartford***oil burner, to Newton-Tunnell Coal Co., 218 Pearl St., Hartford. **P.W.A.** Noted Jan. 9, C. D.—Jan. 16, E. N.-R., under "Contracts Awarded."

Conn., Westport—Joseph Lasprogato & Co., general contractors, 79 Washington St., South Norwalk, painting for Staples High School addition, to A. H. Cohen, 139 Washington St., South Norwalk, for Town, R. W. Fuller, chn. School Bd.***marble and terrazzo, to Architectural Tiling & Terrazzo Co., 1020 Congress Ave., New Haven***iron, to E. and M. Iron Wks., 26 Woodrow St., Stamford***reinforcing steel, to Kalman Steel Co., 25 Broadway, New York ***bluestone, to Brennan Stone Co., 208 Housatonic Ave., Bridgeport***sewage disposal, to Nustone Products Corp., Chapel St., New Haven ***oil burner, to Petroleum Heat & Power Co., Stamford. Noted Jan. 2, C.D.—Jan. 9 E.N.-R., under "Contracts Awarded."

†Conn., Westport—E. F. Guth, general contractor, Jefferson and Washington Aves., St. Louis, Mo., wire work for U. S. Post Office, State and Bay Sts., for Treas. Dpt. at office Sup. Archt., Wash., D. C., to Bellis Wire Wks., 307 Scholes St., Brooklyn, N. Y.***hollow metal, to Metal Door & Trim Co., 370 Lexington Ave., New York***vault doors, to Diebolt Safe & Lock Co., 372 Bway., New York*** skylight ventilators, to Simon Ventlighter Co., 101 Park Ave., New York***wood floors, to DiNatale Floor Constr. Co., 305 Congress St., Boston, Mass.***electrical work, to Westport Electric Co., 43 Main St.***electric power, to Connecticut Light & Power Co., Main St.*** cast stone, to Paul & Russell, Inc., Westmount, N. J.***mill finish, to A. W. Burriett Co., Knowlton St., Bridgeport***brick work, to Jamaica Constr. Corp., 26 Court St., Brooklyn, N. Y.***plumbing and heating, to W. H. Clark, 160 Elm St., Bridgeport***refrigeration, to Standard Refrigeration & Sheet Metal Wks., Inc., 362 Coney Island Ave., Brooklyn, N. Y. ***iron, to Stamford Iron Supply Co., 234 Canal St., Stamford***face brick, to I. L. Stiles & Son Brick Co., North Haven***common brick materials, to Bishop & Lynes, East Main St., Norwalk. Noted Dec. 30, C. D.—Jan. 2, E. N.-R., under "Contracts Awarded."

D. C., Wash.—District Comrs., District Bldg., constructing school building, to J. W. Hunt Co., 809 Chandler Bldg., $108,105. Bids Jan. 10. Noted Jan. 3, C. D.

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★ **†Fla., Pensacola**—Yards & Docks, Navy Dpt., Wash., D. C., to Virginia Eng. Co., Melson Bldg., Newport News, Va., paving and exterior services at Naval Air Station, Spec. 8064, $246,302; constructing quarters, Spec. 8083, $944,000***hangars, storehouse, etc., Spec. 8082, $1,184,800. Grand total $2,375,102. Bids Jan. 15. Noted Jan. 20, C.D. Noted Jan. 3, C.D.—Jan. 9, E.N.-R.

Ill., Chicago—Dpt. P. Wks. and Buildings, Div. Architecture, Springfield, heating and ventilating for hospital and solarium at Research and Educational Hospital, Orthopedic building addition, to Gallaher & Speck, 546 West Harrison St., $9,884 and $635 respectively*** plumbing, to Fettes, Love & Sieben, 4105 West Damon Ave., $17,300***electrical wiring, to Hoffman Electric Co., 3635 Van Buren St., $12,865. Grand total $40,684. **P.W.A.** Bids Dec. 30. Awarded Jan. 4.

Ill., Champaign—City, B. J. Marshall, clk., general contract 3 story, brick, concrete, stone city building, to W. C. F. Kuehne, Rantoul, $148,300***electrical work, to J. M. Bean Electric Co., Urbana, $4,860***heating, to Carson-Payson Co., Danville, $9,913***plumbing, to G. Zirhut, Champlain, $8,750. Grand total $171,823. **P.W.A.** Bids Dec. 11.

Ill., Elgin—Dpt. P. Wks. and Buildings, Div. Architecture, Springfield, general contract staff house for Elgin State Hospital, to James McHugh Sons, 6449 South Park St., Chicago, $92,-985; general contract 2 infirmaries, to S. E. Nielson Co., 3059 Augusta Bldg., Chicago, $207,700. **P.W.A.** Bids Dec. 30.

Ill., Kankakee—Dpt. P. Wks. and Buildings, Div. Architecture, Springfield, pipe covering at Infirmary, Kankakee State Hospital, to Illinois Philip Carey Co., 2100 Fullerton Ave., Chicago, $3,375***electrical wiring, to Divane Bros., 3826 Van Buren St., Chicago, $4,598***heating, to Gallaher & Speck, 546 Harrison St., Chicago, $10,856***plumbing, to J. J. Calnan, 440 South Dearborn St., Chicago, $13,830. Grand total $32,649. **P.W.A.** Bids Dec. 30. Noted Dec. 19, C.D.

Ill., Manteno—Dpt. P. Wks. and Buildings, Div. Architecture, Springfield, general contract doctors' cottages and chief engineer's residence, Manteno State Hospital, to Chell & Anderson, 176 West Adams St., Chicago, $69,000***electric wiring, to Hoffman Electric Co., 2525 West Vanburn St., Chicago, $10,238***heating, to Hanley & Co. 1503 South Michigan Ave., Chicago, $14,238***plumbing, to H. P. Roger & Co., 1501 East 72nd Pl., Chicago, $15,875*** general contract 2 hydro therapy buildings and mechanical storage building, to Patrick Warren Constr. Co., 226 North LaSalle St., Chicago, $200,000 and $97,000 respectively. Grand total $402,351. **P.W.A.** Bids Dec. 20. Noted Dec. 19, C.D.

Ill., Springfield—City, City Hall, steam turbine driven pump for new power plant at Lake Springfield, to DeLavel Steam Turbine Co., 900 North Clinton Ave., Trenton, N. J., $29,162. Bids Jan. 6, awarded Jan. 17. Noted Jan. 10, C. D.—Jan. 16, E. N.-R.

★ **Ill., Urbana**—University of Illinois, A. C. Willard, pres., general contract (2nd unit) 9 story, with 6 story tower medical and dental laboratories, to J. W. Snyder Co., 307 North Michigan Ave., Chicago, $964,850***elevator, to Haughton Elevator & Machine Co., 671 Spencer St., Toledo, O., $53,700*** electrical work, to Divane Bros., 3826 Van Buren St., Chicago, $69,975***plumbing, to O'Callaghan Bros., 21 South Greene St., Chicago, $112,900*** heating, to R. Gordon, Inc., 22 West Austin Ave., Chicago, $77,378***ventilating, to Bloomer Heating & Ventilating, Inc., 1245 West 47th St., Chicago, $56,777. Grand total $1,335,590. **P.W.A.** Bids Nov. 25. Noted Nov. 15, C.D.

Ky., Bowling Green—Western Kentucky State Teachers College, H. H. Cherry, pres., excavation and foundation for laboratory and classroom building, to G. H. Rombell Co., 958 Logan St., Louisville. Bids Dec. 14. Bids later on superstructure. Noted Dec. 12, C. D.

Me., Portland—F. W. Cunningham & Sons, general contractors, 181 State St., heating and plumbing for Ward 5 Wing alterations, to Farrington Hospital, and Boothby Home, for City, to E. N. Cunningham Co., 363 Cumberland Ave.***electrical work, to E. S. Boulos Co., 9 Casco St.***structural steel and iron, to Mcguire & Jones Co., 31 Pearl St.***painting, to G. W. Osterburg Co., 85 Center St.***excavating, masonry, waterproofing, dampproofing and insulation by general contractors. Noted Dec. 2, C. D.—Dec. 5, E. N.-R., under "Contracts Awarded."

Me., Pownall — Brown Constr. Co., general contractors, 574-A Congress St., Portland, heating for male and female dormitories at Pownall State School, West Pownall, for State, Dpt. Health & Welfare, State House, Augusta, to G. Fels Co., 42 Union St., Portland***plumbing, to Scribner & Iverson, 64 Union St., Portland***electrical work, to Cutler & Cutler, Inc., 186 Federal St., Portland***painting, to O. R. Main & Co., 46-A Portland St., Portland*** roofing, to Hahnel Bros. Co., 42 Main St., Lewiston***stone, to Maine & N. H. Granite Corp., North Jay***structural steel and iron, to Hussey Mfg. Co., Railroad Ave., North Berwick ***reinforcing steel, to Concrete Steel Co., 294 Washington St., Boston, Mass. Noted Dec. 11, C. D.—Dec. 19, E. N.-R., under "Contracts Awarded."

†Mass., Boston—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing Milton Branch U. S. Post Office, to English Constr. Co., 151 Plain St., Lowell, $76,000. Bids Dec. 27. Noted Jan. 6, C. D.—Dec. 5, E. N.-R.

†Mass., Boston—Treas. Dpt. at office Sup. Archt., Wash., D. C., lighting fixtures, to Reading Chandelier Wks., 503 Penn St., Reading, Pa., $13,350. Bids Dec. 5, awarded Jan. 16. Noted Dec. 13, C. D.—Nov. 28, E. N.-R.

Mass., East Bridgewater—R. H. Sewell, general contractor, 34 A Main St., Franklin, excavation for high school additions and alterations for Town, M. J. McCarthy, chn. Building Comm. to M. F. Roach & Sons, Inc., 55 Spring St., East Bridgewater***structural steel, to West End Iron Wks., 263 Columbia St., Cambridge ***plumbing, to Thomas F. Harney & Sons, 12 Foster St., Worcester***electrical work, to Crawford Electric Co., 165 Rodman St., Fall River ***heating, to Acme Heating & Ventilating Co., 13 Hawkins St., Boston. Noted Jan. 2, C.D.—Jan. 9, E.N.-R., under "Contracts Awarded."

Mass., Haverhill—Walsh Bros., general contractors, 150 Hampshire St., Cambridge, painting for Hale Hospital Addition, to H. Newton Marshall Co., 522 Harrison Ave., Boston, for City of Haverhill. Noted Jan. 17, C. D.—Jan. 23, E. N.-R., under "Contracts Awarded."

Mass, Marblehead—E. J. Rappoli, general contractor, 515 Mass. Ave., Cambridge, electrical work for Senior-Junior High School addition to Barnes Pope Co., 98 Brookline Ave., Boston, for Town, W. G. Martin, secy. Bd., Town Hall ***rock excavating, to Cerulli Contg. Co., 174 Bayswater St., East Boston***heating, plumbing and ventilating, to R. T. Pender, Inc., 33 Sutton St., Lynn***bleachers, to J. L. Hammett Co., 290 Main St., Cambridge***light iron, to Everett Iron Works Co., 31 Orient Ave., Everett***tile, terrazzo, to Pignat Vicenzi, Mosaic Co., 147 Orleans St., East Boston***roofing, sheet metal, to Burgess & Blacher Co., 18 Eustis St., Roxbury***kalamein, to Rubin Burke Co., 216 Tremont St., Boston***painting, to Russell McCaffey, West Newton***reinforcing steel bar joists, to Kalman Steel Co., 75 Federal St., Boston***cast stone, to Cambridge Cement Stone Co., 156 Lincoln St., Brighton***structural steel, to New England Structural Co., 310 2nd St., Everett***miscellaneous steel, to Detroit Steel Products Co., 38 Chauncy St., Boston*** millwork, to Brockway-Smith-Haigh-Lovell Co., 465 Medford St., Charlestown. Noted Dec. 16, C. D.—Dec. 19, E. N.-R., under "Contracts Awarded"

Mass., Revere—Concrete Constr. Co., general contractors, 11 Garfield Ave., Chelsea, plumbing, heating and ventilating for additions to Paul Revere School, to Capital Plumbing & Heating Co., 228 Harrison Ave., Boston, for City, School Dpt., City Hall***cast stone, to Eastern Cement Stone Co., Lynn St., Malden ***painting, to C. D. Garbutt, 58 Trevalley Rd., Revere***structural steel and light iron to Progressive Iron Wks., Inc., 150 4th St., Chelsea***electrical work, to Revere Electric Co., 12 Davis St., Revere. Noted Jan. 2, C. D. —Jan. 9, E. N.-R., under "Contracts Awarded."

Mass., Swampscott—M. Spinelli & Sons, general contractors, 38 Chauncey St., Boston, cast stone for brick, steel, stone high school, Greenwood Ave., for Town School Bldg. Comm., to Eastern Cement Stone Co., Lynn St., Malden ***painting, to A. D. Howlett, 110 Worcester St., Boston***reinforcing steel, to Morrison Stevens Co., 6 Beacon St., Boston***electrical work, to Lord Electric Co., 303 Columbus Ave., Boston***brick, to Dolben & Co., 200 Washington St., Boston. Noted Jan. 17, C. D.—Jan. 23, E. N.-R.

†Mass., Wakefield—Long Constr. Co., general contractors, 185 Devonshire St., Boston, plumbing, for U. S. Post Office, for Treas. Dpt. at office Sup. Archt., Wash., D. C., to Lappin Bros. Co., 17 Irving St., Malden***heating, to Florence & Abbott, Inc., 75 Sudbury St., Boston ***electrical work, to Balcom Bros., 29 Irving St. Bids Nov. 29. Noted Jan. 3, C. D.—Jan. 9, E. N.-R.

Minn., Gaylord—Bd. Educ., general contract 2 story, basement school, to Madsen & Simonsen, 2817 Lyndale Ave. S., Minneapolis, $112,-925***plumbing, heating, ventilating, to R. L. Anderson, 519 Cleveland Ave. N., St. Paul, $20,852***wiring, to L. M. Gross Electric Co., 917 St. Germaine St., St. Cloud, $5,898. Grand total $139,675. **P.W.A.** Bids Jan. 2. Noted Dec. 19, C. D.—Dec. 26, E. N.-R.

Minn., Glenwood — Bd. Educ., general contract 3 story, basement, 180x210 ft. school to J. P. Haley, 1954 University Ave., St. Paul, $154,900***plumbing, heating, ventilating, to P. J. Gallagher & Sons, Faribault, $22,350*** wiring, to C. H. Rosecrans Electric Co., 414 Sibley St., St. Paul, $5,778. Grand total $183,-028. **P.W.A.** Bids Jan. 7. Noted Dec. 30, C. D.—Dec. 12, E. N.-R.

Minn., Minneapolis—State Comrs. Administration & Finance, 210 State Capitol, St. Paul, general contract 1 story, top addition, 100x192 ft., hospital, University of Minnesota campus, to M. J. O'Neil, 609 New York Bldg., St. Paul, $72,736***plumbing, heating and ventilating, to Harris Bros., 217 West Lake St., Minneapolis, $27,970***wiring, to Kvalsten Electric Co., 3819 Upton Ave. N., $8,350***elevator, to Otis Elevator Co., 314 South 10th St., $10,900. Grand total $119,956. **P.W.A.** Bids Jan. 10. Noted Dec. 30, C. D.—Jan. 2, E. N.-R.

Minn., Robbinsdale—Bd. Educ., general contract 2 story, basement, rein.-con., brick school, to C. H. Peterson & Co., 1036 Builders Exchange Bldg., Minneapolis, about $169,000. **P.W.A.** Bids Jan. 15. Noted Jan. 6, C. D.—Jan. 9, E. N.-R.

N. H., Concord—Pieretti Bros., general contractors, Centerbrook, Conn., paint, for East-

Public Buildings (Continued)

man School, for City, to E. A. McGlauflin Decorating Co., 107 Leland St., Portland, Me.; stone, to Perry Bros. Granite Co., rear 216 North State St. Noted Nov. 27, C. D.—Dec. 5, E. N.-R., under "Contracts Awarded."

N. H., Durham—W. H. Trumbull, general contractor, 11 Lebanon St., Hanover, heating for grade school, to V. J. Kenneally Co., 251 Causeway St., Boston, Mass.•••plumbing, to J. H. Stevens, 46 Manchester St., Manchester •••electrical work, to Jas. Wilkinson & Co., 128 Oliver St., Boston. **P.W.A.** Noted Jan. 23, C. D.—Jan. 16, E. N.-R.

N. Y., Brooklyn—Bd. Educ., 500 Park Ave., New York, constructing P. S. 207 additions, to Lundin Halwer Corp., 103 East 125th St., New York, $206,840. **P.W.A.** Bids Dec. 27.

N. Y., Dryden—Central School Dist. 1, excavating, grading, sewage disposal for school, to J. Lonergan, 203 Strathmore Dr., Syracuse. Total est. $304,500. **P.W.A.** Noted Jan. 21, C. D.

N. Y., Gloversville—Bd. Educ., foundations for school, McNabs St., to Moore & Suits, South Kingsboro Ave., Gloversville. Total est. $188,366. Contractor let contract for reinforcing steel, to Strope Steel Co., Inc., Terminal St., Albany. **P.W.A.** Bids Nov. 12. Noted Nov. 26, C. D.—Nov. 7, E. N.-R.

N. Y., Gowanda—Village, electrical work for village hall, fire and police headquarters, Main St., to Wipperman & Mitchell, 404 North Oak St., Buffalo. **P.W.A.** Previous award rescinded. Bids for plumbing, heating and ventilating not approved by P.W.A. and will readvertise. Noted Dec. 2, C. D.—Dec. 5, E. N.-R., under "Contracts Awarded."

N. Y., Jamestown—City, L. F. Roberts, mayor, City Hall, excavation, foundations for hospital, Jones Hill, to Warren Constr. Co., 336 Steele St. Total est. $80,000. **P.W.A.** Bids on superstructure later. Bids Nov. 14. Noted Nov. 25, C. D.—Nov. 7, E. N.-R.

N. Y., Lockport—City, heating for library, East Ave., to J. Davis Root Bldg., Buffalo••• plumbing, to Mathews Plumbing & Heating Co., 922 Ontario Ave., Niagara Falls•••electrical work, to Wipperman & Mitchell, 404 North Oak St., Buffalo. **P.W.A.** Bids Jan. 9. Noted Jan. 16, C. D.

†N. Y., New York—Treas. Dpt. at office Sup. Archt., Wash., D. C., general contract Madison Square Post Office, to D. M. W. Contg. Co., 2058 Fulton St., Brooklyn, $439,000. General contractor sublet contract for 800 tons structural steel, to Bethlehem Fabricators, Bethlehem, Pa. Noted Dec. 10, C. D.—Oct. 31, E. N.-R.

N. Y., Rochester—A. Friederich & Sons Co., general contractors, 710 Lake Ave., structural steel for high school, Genesee St., for Bd. Educ., to F. L. Hughes & Co.| 1029 Lyell Ave.; excavation, to M. DiFiore, 230 Titus Ave. Noted Dec. 2, C. D.—Dec. 5, E. N.-R., under "Contracts Awarded."

N. Y., Rockaway—Lustig & Weil, Inc., general contractors, 145 East 32nd St., New York, 175 tons structural steel for new power plant, at Neponsit Beach Hospital, for Dpt. Hospitals, Municipal Bldg., New York, to Drier Iron Wks., 740 East 12th St., New York. Noted Dec. 26, C. D.—Jan. 2, E. N.-R.

N. Y., Union Springs—Bd. Educ., Union Springs, excavation, grading, demolishing buildings for school, to D. W. Winkelman, Heffernan Bldg., Syracuse. Total est. $318,000. P.W.A. Bids Jan. 14.

N. Y., Watervliet—J. J. Turner & Sons, general contractors, Amsterdam, reinforcing steel and steel joists for brick, steel school, plain found., to Bethlehem Steel Corp., Bethlehem, Pa., for Bd. Educ. **P.W.A.** Noted Jan. 16, C. D.—Jan. 23, E. N.-R., under "Contracts Awarded."

†O., Cincinnati—P. Wks. Administration, Div. Housing, Wash., D. C., demolition of buildings on site of Laurel Homes Building Development, to Cleveland Wrecking Co. of Cincinnati, $44,345. Former contractor unable to qualify under terms of contract. Noted Dec. 17, C. D. —Dec. 19, E. N.-R., under "Contracts Awarded."

Ore., Portland—City, general contract remodeling city hall, to Reimers & Jolivette, Railway Exch. Bldg., $149,862. **P.W.A.** Bids Jan. 9. Noted Jan. 16, C. D.

Pa., North East—Bd. Educ., general contract 2 story, basement, brick, steel school, to Kirschner Bros., 433 East 95th St., Erie. Est. $130,000. **P.W.A.** Noted Jan. 7, C. D.—Jan. 9, E. N.-R.

Pa., Olyphant—Olyphant School Bd., general contract brick, steel addition to Junior High School, to Breig Bros., Scranton Real Estate Bldg., Scranton, $139,647•••plumbing, to James Lally, Olyphant, $5,043•••heating and ventilating, to E. A. Campagne, 818 West Lackawanna Ave., Scranton, $17,225•••electrical work, to F. E. Baldwin, Olyphant, $6,400. Grand total $168,315. **P.W.A.** Noted Jan. 14, C. D.

★**Pa., Pittsburgh**—H. W. Cramblet, secy. Pittsburgh Bd. Public Educ., 251 Administration Building **(1)** brick, steel school buildings at Burgwin Elementary School, est. $436,807 **(2)** at Banksville School, est. $170,000; (3) at Washington Trade School, est. $470,421 (a) general contract (b) heating and ventilating (c) plumbing **(d)** electrical work, to Melton Stuart Co., Oliver Bldg., **(1a)** $229,830 (3a) $273,300•••to Henry Busse Co., Wabash Ave. **W.E. Pittsburgh, (2a) $108,000•••to** G. F. Higgins, Wabash Bldg., (3b) $81,370•••

†Federal Government.

to W. N. Sauer Co., 806 Chestnut St. N.S., Pittsburgh, **(2b)** $18,450 **(2c)** $10,650•••to R. W. Chindler Co., 109 Arnold St. W.E., Pittsburgh, **(3d)** $8,358•••to Bartley O'Neil Co., 414 Penn Ave., **(1b)** $54,420•••to Moss & Blakely, 223 Beltzhoover Ave., **(1c)** $17,995 **(3c)** $21,787•••to Morganstern Electric Co., Blvd. of Allies, **(1d)** $21,516•••to Fort Pitt Electric Co., 600 2nd Ave., **(3d)** $48,411. Grand total $804,076. Total est. $1,077,228. **P.W.A.** Bids Dec. 11. Noted Dec. 27, C. D.—Oct. 17, E. N.-R.

R. I., Howard (Cranston)—State, Emergency P. Wks. Comn., State House, Providence, heating work for vocational school and administration building at Sockannosset School, to Taylor Heating Co., $15,999•••plumbing, to Tierney Robinson Co., Inc., 520 Westminster St., Providence, $13,390•••electrical work, to Rust Electric Co., 25 Fountain St., Providence. $9,475. Grand total $38,835. **P.W.A.** Noted Jan. 16, C. D.—Jan. 23, E. N.-R., under "Contracts Awarded"

R. I., Howard (Cranston)—State Emergency P. Wks. Comn., State House, Providence, heating for 2 buildings, 1 each for disturbed men and women, to Lincoln & Lane Co., 30 Bayley St., Pawtucket, $48,980•••plumbing, to T. R. Douglas, 8 Slocum St., Providence, $66,812••• electrical work for women's building, to Liberty Electric Co., 285 Maple Ave., Barrington, $17,396•••electrical work for men's building, to Electric Maintenance & Equipment Co., 225 Lenox Ave., Providence, about $14,500. Grand total $147,688. Bids Dec. 19. Noted Jan. 21, C.D.—Jan. 23, E.N.-R., under "Contracts Awarded."

R. I., Howard (Cranston)—State, State House, Providence, heating for 22 ward buildings for women at Mental Hospital, to Jas. C. Cassedy, Inc., 133 Austin St., Cambridge, $31,400••• plumbing, to T. R. Douglas, 8 Slocum St., Providence, $45,005•••electrical work, to Brady Electric Co., Inc., 236 Bedford St., Fall River, $31,359. Grand total $107,764. **P.W.A.** Bids Dec. 9, awarded Jan. 16. Noted Jan. 19, C.D.—Jan. 16, E.N.-R., under "Contracts Awarded."

R. I., Howard (Cranston)—State, Emergency P. Wks. Comn., State House, Providence, electrical work for employees' dormitory at Mental Hospital, to Scannevin & Potter, 189 Pine St., Providence, $8,338. **P.W.A.** Bids Dec. 7, awarded Jan. 17. Noted Jan. 16, C.D.—Jan. 23, E.N.-R., under "Contracts Awarded."

R. I., Howard—(Cranston)—State, Emergency P. Wks. Comn., State House, Providence, heating for auditorium, gymnasium and swimming pool at Sockanosset School, to Lincoln & Lane Co., 30 Bayley St., Pawtucket, $10,420; plumbing, to J. P. Cuddigan, 938 Broadway, Providence. **P.W.A.** Bids Dec. 18, awarded Jan. 16. Noted Jan. 20, C.D.—Jan. 23, E.N.-R., under "Contracts Awarded"

R. I., Howard (Cranston)—State, Emergency P. Wks. Comn., State House, Providence, general contract, incl. heating, plumbing and electrical work 1 story, basement, brick, steel patients' and employees' cafeteria, at State Hospital, concrete found., to Gilbane Building Co., 86 Calverly St., Providence, $62,000•••general contract male ward building, to New England Concrete Co., 381 Promenade St., Providence, $241,272•••heating for same, to Hartwell Co., Inc., 87 Weybosset St., Providence, $17,141. Grand total $320,413. **P.W.A.** Bids Jan. 3 and Dec. 9, awarded Jan. 16 and 15. State, Emergency P. Wks. Comn. rejected bids Jan. 6, 3 story, basement tubercular building at Mental Hospital, will readvertise. Noted Jan. 13, C. D. and Dec. 19, C. D.—Oct. 17, E. N.-R.

R. I., Providence—Jas. Stewart & Co., general contractors, 230 Park Ave., New York, structural steel for 7 story, basement, 70x250 ft. school, to James H. Tower Iron Wks., 50 Borden St., Providence, for Rhode Island School of Design, Bd. Trustees, 11 Waterman St.•••reinforcing steel, to Kalman Steel Co., 65 Federal St., Boston, Mass.•••iron, to Norfolk Iron Co., 33 Newport Ave., Quincy, Mass.••• stone, to Vermont Marble Co., 44 School St., Boston, Mass.•••limestone, to Ornamental Limestone Co., Syracuse, N. Y.•••marble, to Freeport Marble & Tile Co., Inc., 264 Adams St., Dorchester, Mass.•••painting, to Johnson Bros., 26 College St., Providence. Noted Jan. 9, C. D.—Jan. 16, E. N.-R., under "Contracts Awarded."

R. I., Providence—City, Bd. Contract & Supply, City Hall, heating for Senior High School, 3 story, basement, to Files Eng. Co., 710 Eddy St., $202,460. **P.W.A.** Bids Oct. 14, awarded Jan. 20. Noted Jan. 8, C.D.—Jan. 16, E.N.-R., under "Contracts Awarded."

★**Tenn., Nashville** — Davidson Co. Public Building & Courthouse Comn. at office of Hon. L. Hickman, judge, at temporary courthouse, 8th Ave. N. and Commerce St., constructing city-county court house, City Square, to J. A. Jones Constr. Co., Commercial Bank Bldg., Charlotte, N. C., $1,775,000. Est. $1,000,000. Bids Jan. 21, awarded Jan. 21. Noted Nov. 29, C. D.—Dec. 5, E. N.-R.

Tex., Port Arthur — Bd. Educ., c/o L. B. Abbey, pres., 1 story, 88x164 ft. semi-fireproof school, to W. L. James, Port Arthur, $107,800 •••millwork, to Port Arthur Planing Mill, Port Arthur, $7,800•••reinforcing steel, to Concrete Eng. Co., Port Arthur, $11,600. Grand total $127,200. **P.W.A.**

Utah, Ogden—Bd. Educ., foundations, tunnels, utility chambers, walls, etc., for school, to Curtis & Johnson, 1023 Elm St., Salt Lake City, $21,366. **P.W.A.** Bids Jan. 14. Noted Jan. 10, C. D.

Wash., Seattle — University of Washington, constructing aerodynamics building, to Daily Constr. Co., Lloyd Bldg., $62,872•••electrical work, to Westinghouse Electric & Mfg. Co., Lloyd Bldg., $34,980•••machinery, to H. R. L. Motor Co., 3301 1st St. S., $12,884. Grand total $110,736. **P.W.A.** Noted Dec. 18, C. D. —Dec. 26, E. N.-R.

Wash., Walla Walla—School Dist. constructing 122x170 ft. gymnasium, to Colonial Constr. Co., 326 1st St., Spokane, $86,597•••electrical work, to G. A. Estep, 717 West Yakima St., Yakima, $3,268•••1 story, 80x115 ft. school, to Brady Constr. Co., Lloyd Bldg., Seattle, $30,690•••plumbing and heating for gymnasium and mechanical work for school, to W. R. O'Rourke, 109 South Second St., $21,408 and $6,798 respectively. Grand total $148,761. **P.W.A.** Noted Jan. 20, C.D.—Jan. 23, E.N.-R.

†Wis., Milwaukee—G. A. Fuller, general contractor, 111 West Washington St., Chicago, Ill., 825 tons structural steel for Parklawn Housing Project, for Treas. Dpt. at office Sup. Archt., Wash., D. C., to Concrete Steel Co., 3109 South Central Park Ave., Chicago, Ill. Noted Dec. 23, C. D.—Dec. 26, E. N.-R., under "Contracts Awarded."

Wis., Reedsburg—Bd. Educ., Madison, furnishing structural steel floor joists for school, to Wausau Iron Wks., Wausau, $18,273. Bids Jan. 8. Noted Nov. 7, C. D.—Nov. 14, E. N.-R.

COMMERCIAL BUILDINGS

PROPOSED WORK

★**Conn., Hartford** — Trinity College, R. B. Ogilby, pres., 115 Vernon St., plans by McKim Mead & White, 101 Park Ave., New York, fine arts unit, $150,000. Total $800,000. **Maturity indefinite.**

Ind., Bloomington—Bd. Trustees Indiana University, plans by A. W. Strauss, 415 Cal-Wayne Bldg., Fort Wayne, constructing new medical school unit. $472,000.

Md., Baltimore — Belvidere Hotel, Charles and Chase St., making plans modernizing and renovating present hotel building, Charles and Chase Sts. $300,000. Private plans.

Md., Baltimore — Franklin Square Hospital, Fayette and Calhoun Sts., soon lets contract 4 story, basement, new hospital building, plumbing, heating, wiring and elevator, Fayette and Calhoun Sts. $175,000. Crisp & Edmunds, 409 Calvert Bldg., archts. Noted Dec. 19, C. D., under "Public Buildings."

Mass., Brighton—J. Werman, 24 School St., Boston, plans apartment, Kilsyth Rd. To exceed $140,000. **Maturity indefinite.** Architect not appointed.

Mich., Detroit—Singer Sewing Machine Co., 610 Stephenson Bldg., plans by Smith, Hinchman & Grylls, Marquette Bldg., 5 story, basement, brick, steel, stone, concrete mercantile building, plain found., Woodward St. $140,000.

Neb., Lincoln—Student Union of University of Nebraska, plans by Davis & Wilson, Lincoln, constructing student building, $400,000. P.W.A. project.

Neb., Omaha—Holy Cross Parish, 5056 Center St., plans by Lahr & Stengel, 1424 WOW Bldg., Omaha, constructing church and parish school, 48th and Woolworth Ave. $150,000. **Maturity in spring.**

N. J., Belleville—St. Peters Catholic Church, William St., plans by Fanning & Shaw, 49 Ward St., Paterson, new school, in Essex Co. $150,000.

★**N. J., Bound Brook**—Schwartz Land & Impvt. Co., 154 Nassau St., New York, plans by Shteir & Wolf, 850 Broad St., Newark, constructing residence development, 100 homes of 2¼ story, basement, brick, stone. Cost between $4,500 to $6,000 each. Est. $500,000 plus.

N. J., Livingston—Delmon Constr. Co., c/o M. A. Wolf, archt., 850 Broad St., plans residence development consisting of 50 homes, on DeMarco Ave., $3,500 each. Total est. $175,000 plus.

N. J., Livingston—Loyal Realty Co., c/o M. A. Wolf, archt., 850 Broad St., Newark, plans constructing residence development consisting of 40 homes on Mt. Pleasant Ave., $5,950 each. Total est. $238,000 plus.

N. J., Livingston—Philips Constr. Co., c/o M. A. Wolf, archt., 850 Broad St., Newark, plans residential development consisting of seventy-five 2 story, basement houses on 113 acre site, $5,000 each. Total est. $375,000 plus.

N. J., Roseland—Oscar Stempler, c/o M. A. Wolf, architect, 850 Broad St., plans constructing residential development of 30 homes on Passaic Ave. $150,000.

N. J., West Orange — Park Development & Realty Co., c/o M. A. Wolf, archt., 850 Broad St., plans constructing residential development on Eagle Rock Ave. $150,000.

N. Y., Albany—Montgomery Ward & Co., 619 West Chicago Ave., Chicago, Ill., plans by R. R. Rowe, c/o owners, and takes bids in March, 5 story, mail order building addition, Bway. $500,000.

N. Y., Annandale-on-Hudson—Bard College, 405 Lexington Ave., New York, bids in March or later constructing brick, steel dormitory, plain found. $150,000. Evans, Moore & Woodbridge, 101 Park Ave., New York, archts.

N. Y., Bellrose—Bellrose Housing Corp., 163-18 Jamaica Ave., Jamaica, plans by F. J. Burmeister, 155-31 Jamaica Ave., Jamaica, constructing group 2 story, frame dwellings, 87th St. east of 249th St. $140,000.

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Commercial Buildings (Continued)

N. Y., Brooklyn—Veribest Homes, Inc., 287 East 51st St., M. Richie, pres., plans by M. E. Ungarleider, 191 Joralemon St., group 2 story, 17x53 ft., brick dwellings, in vicinity of 261 East 57th St. $148,000.

N. Y., Brooklyn—Schumer & Stranss, 26 Court St., plans by J. J. Millman, 191 Joralemon St., 6 story, 131x200 ft. apartment, 13th St. near Ocean View Ave. $145,000.

N. Y., Flushing—Morris Roth, c/o Halleran Agency, 134-28 Northern Blvd., plans constructing group dwellings on 77 lots, Main St., Cherry, Colden and Elder Aves. $140,000. Architect not appointed. Site acquired.

N. Y., Forest Hills—G. L. Carle, Inc., 6 Burns St., plans by J. Unger, 39-01 Main St., Flushing, constructing group 2 story, brick dwellings, Burns St. $140,000.

N. Y., Jackson Heights—Hayes Avenue Realty Corp., 189 Montague St., Brooklyn, plans by J. Tabatchnik, 1140 41st St., Brooklyn, or c/o owner, 6 story, 100x200 ft. apartment, 34th Ave. and 85th St. $300,000.

N. Y., Jamaica — Queens Nassau Realty Liquidating Corp., c/o Harris Potts, 163-10 Salton Ave., plans group frame dwellings, Jamaica Bay (former Bergen tract). To exceed $150,000. Architect not appointed.

N. Y., Laurelton—English Cottage Homes, 45-47 49th St., Woodside, plans by A. Fahr, c/o owner, group 2 story, frame dwellings, Cross Island Blvd. and 131st Rd. $150,000.

N. Y., Manhasset—Levitt & Sons, Strathmore at Manhasset, plans group dwellings on 90 acre site, Northern Blvd. (former F. A. Munsey estate). To exceed $250,000. Architect not appointed.

N. Y., New Hyde Park—Commuters Housing Corp., c/o Lewis Land Corp., Little Neck, plans group frame dwellings on 500 lots, New Hyde Park Ave. near Hillside Ave. To exceed $140,000. Site acquired. Architect not appointed.

N. Y., New York — Ely Holding Corp., c/o H. Weprim, 47 East 44th St., plans apartments, West 218th St. and Park Terrace. $140,000.

N. Y., New York—Emerdyke Realty Corp., 572 Madison Ave., plans by H. I. Feldman, 15 West 44th St., 6 story apartment, 4913 Bway. $350,000.

N. Y., New York—F. Fanoni, 148 East 33rd St., plans by M. Exerjian, 148 East 33rd St., altering heating in three 4 story apartments, 232 East 52nd St. $318,000.

N. Y., New York — Lansvog Holding Corp., B. London, pres., 21 East 40th St. plans by J. M. Felson, 250 West 57th St., 6 story, 170x170 ft. apartment, 1707 St. Nicholas Ave. $400,000.

N. Y., New York — Skaler Apartments, Inc., 45 West 167th St. plans by A. B. Bates, c/o owner, 6 story apartment, Woodycrest Ave. and 167th St. $140,000.

N. Y., New York—Walger Realty Co., 641 6th Ave., plans by Miller & Goldhammer, c/o owner, 6 story apartment, Walton Ave. and 153rd St. $360,000.

N. Y., Schenectady—Metropolitan Life Insurance Co., 1 Madison Ave., New York, plans completed by R. L. Bowen, 207 State St., and takes bids in spring brick, steel office and store building, 313 State St. To exceed $105,000.

N. Y., Springfield—A. Aragona, 109-09 Liverpool St., Jamaica, plans by J. E. Cahill, 89-64 163rd St., Jamaica, group 1 story, frame dwellings, 171st St. and 137th Ave. $140,000.

Pa., Pittsburgh—Mt. Oliver Branch, German Beneficial Union, C. Miller, secy., Mt. Oliver, plans rebuilding 2 story, basement lodge building, Arlington and Brownsville Rds., destroyed by fire. $150,000. Architect not appointed.

B. C., Vancouver — Point Grey Realty Co. Ltd., 3712 West 10th Ave., site being cleared for constructing houses on 60 lots, 31st, 32nd and 33rd Aves. $300,000.

BIDS ASKED

Ind., Bloomington—Bd. Trustees Indiana University, bids about Feb. 15, 3 story, basement, rein.-con. medical school, 3rd St. and Forest Pl. $472,000. P.W.A. project. A. M. Strauss, 415 Cal-Wayne Bldg., Fort Wayne, archt. Noted Jan. 17, C. D.—Jan. 23, E. N.-R.

N. J., Teaneck—See "Contracts Awarded."

N. Y., Brooklyn—A. E. and A. A. Sockman, 188-11 Illion Ave., Hollis, bids about Feb. 1, store and theatre, Church Ave. and 7th St. $350,000. Scacchetti & Siegel, 1860 Bway., New York, archt.

N. Y., Brooklyn—See "Contracts Awarded."

N. Y., New York—See "Contracts Awarded."

N. Y., New York—International Committee of Y. M. C. A., 347 Madison Ave., bids about May 1 or later, altering heating in Y. M. C. A., 233 East 11th St., $37,000 or more. Clinton & Russell, 70 Pine St., archts.

N. Y., Rochester—See "Contracts Awarded."

N. Y., Springfield—See "Contracts Awarded."

N. Y., Winfield—See "Contracts Awarded."

O., Cleveland—Feb. 11, by Ohio Bell Telephone Co., 750 Huron Rd., G. A. Kositzky, ch. engr., 2 story, basement, 115x115 ft., brick, rein.-con. telephone exchange building, East 107th and Wilbur Sts. $250,000. Noted July 8, C. D.—July 11, E. N.-R.

CONTRACTS AWARDED

★ **Ga., Atlanta**—S. H. Kress & Co., 114 Fifth Ave., New York, constructing 4 story, basement, brick, stone, rein.-con. store, to A. K. Adams & Co., Atlanta, about $600,000. E. F. Sibbert, New York City, archt.

N. J., Teaneck—Louis Gold, 122 East 42nd St., New York, constructing group of 30 dwellings on 40 acre tract, on Monterey Ave., Warren Parkway and Bennett Rd., separate contracts. To exceed $100,000. Noted Jan. 14, C.D.—Jan. 16, E.N.-R.

N. Y., Brooklyn—Park Homes, Inc., 66 Court St., group 2 story, brick dwellings, Gerritsen Ave., separate contracts. To exceed $140,000. B. Driesler, Jr., 163 Remsen St., archt. Noted Dec. 27, C. D.—Jan. 2, E. N.-R.

N. Y., Brooklyn — Park Homes, Inc., 66 Court St., constructing group 2 story brick dwellings, 2004 Fillmore Ave., and vicinity, separate contracts. To exceed $140,000. B. Driesler, Jr., 163 Remsen St., archt.

N. Y., Brooklyn—Thirty-Nine Ocean Avenue Corp., 130 Clinton St., 6 story, brick apartment, 35 Ocean Ave., separate contracts awarded. To exceed $140,000. B. W. Dorfman, 56 Court St., archt.

N. Y., Buffalo—Bd. Supervs. Erie Co., general contract office, West Eagle St., to C. H. Everitt, Inc., 295 Auburn Ave., $139,800. P.W.A. Bids Jan. 14. Noted Jan. 20, C. D.—Jan. 9, E. N.-R.

N. Y., Flushing—Friendship Homes, Inc., 150 West 55th St., group 2 story, frame dwellings, 166th St. and Franconia Ave., separate contracts and day labor, $140,000. E. Fels, c/o owner, archt. Noted Dec. 5, C. D.

N. Y., Flushing—F. and L. Realty Corp., 127-05 Merrick Rd., constructing apartments and dwellings, Avery St., separate contracts now being awarded. To exceed $100,000. Lama & Proskauer, 383 Jay St., Brooklyn, archts. Noted Dec. 31, C. D.—Jan. 9, E. N.-R.

N. Y., Jamaica—Doherty Realty Corp., 50-30 Hollis Court Blvd., Flushing, group 2 story, frame dwellings, Chevy Chase Rd., separate contracts now being awarded. To exceed $100,000. D. J. Levinson, 161-02 84th Dr., archt. Noted Dec. 31, C. D.—Jan. 9, E. N.-R.

N. Y., Laurelton—H. and S. Realty Corp., 89-17 161st St., Jamaica, group dwellings, 228th St. and 137th Ave., by separate contracts now being awarded on 1st unit. To exceed $100,000. J. E. Cahill, 89-64 163rd St., Jamaica, archt. Noted Dec. 18, C. D.—Dec. 26, E. N.-R.

N. Y., Little Neck — Colbell Realty Corp., Sutphin Blvd., Jamaica, constructing group frame dwellings, Jobes Pl. and Nassau Blvd., separate contracts. To exceed $140,000. J. E. Cahill, 89-64 163rd St., Jamaica, archt. Noted Dec. 18, C. D.—Dec. 28, E. N.-R.

N. Y., New York — Bank for Savings, 280 4th Ave., New York, altering heating in three 5 story buildings, 334 East 71st St., separate contracts, $37,000 or more. L. E. Ordwein, c/o owner, archt. Noted Dec. 31, C. D. — Jan. 9, E. N.-R.

N Y., New York—Gerard Properties, Inc., 612 West 145th St., constructing 6 story apartment, 176th St. and Monroe Ave., separate contracts now being awarded. $140,000. J. M. Felson, 250 West 57th St., archt. Noted Jan. 6, C. D.—Jan. 9, E. N.-R.

N. Y., New York—Metropolitan Savings Bank, 1 3rd Ave., altering heating in 5 story apartment, 18 West 119th St., separate contracts. To exceed $30,000 with fixtures. A. A. Tearle, 10 West 46th St., archt. Noted Dec. 27, C. D.—Jan. 2, E. N.-R.

N. Y., New York—Sands Place Realty Corp., 1315 Hobart Ave., constructing group 2 story, brick dwellings, Sands Pl. near Westchester Ave., separate contracts. $140,000. J. Vinci, c/o owner, archt.

N. Y., New York—Three Hundred Ninety-Five Sixth Avenue Corp., 535 5th Ave., altering heating in 6 story store and apartment, 395 6th Ave., separate contracts. $37,000. C. J. Storm, c/o owner, archt. Noted Dec. 27, C. D.—Jan. 2, E. N.-R.

N. Y., Rochester—Home Industries, Inc., 43 East Ave., constructing 50 residences near Elmwood Ave. in Brighton, a suburb of here, by own forces. $350,000. **Maturity in April.** C. S. Barrows, 56 James St., archt.

N. Y., Springfield—Linden Park Homes, 229 East 96th St., Brooklyn, constructing group 1 story dwellings, 203rd St. and 119th Ave., day labor and separate contracts. $140,000. A. E. Allen, Garden City, archt. Noted Dec. 31, C. D.—Jan. 9, E. N.-R.

N. Y., Sunnyside—Sun Ray Apartments, Inc., 1935 66th St., Brooklyn, constructing 84x100 ft. apartments, 41st St. and 47th Ave., separate contracts now being awarded. Est. about $140,000. Cohn Bros., 191 Joralemon St., archt. Noted Dec. 18, C. D.—Jan. 2, E. N.-R.

N. Y., Winfield—Wynwood Homes, Inc., 179-26 Anderson Rd., constructing group 2 story dwellings, 64th St. and 50th Ave., separate contracts. $140,000 or more. A. E. Allen, Garden City, archt. Noted Dec. 31, C. D.—Jan. 9, E. N.-R.

O., Cleveland—Cleveland Trust Co., c/o A. A. McCaslin, real estate officer, East 9th St. and Euclid Ave., 3 story, basement, 30x150 ft. store building, 322 Euclid Ave., to G. A. Rutherford Co., 2725 Prospect Ave. Est $150,000. Noted Jan. 3, C. D.—Jan. 10, E. N.-R.

INDUSTRIAL BUILDINGS

PROPOSED WORK

Calif., Los Angeles—FACTORY—T. G. Murphy Co., 3511 East 24th St., plans repairing and altering tar products factory, 3511 East 24th St. $37,000 with equipment. Maturity indefinite. Architect not appointed.

Calif., Niland—PLANT—National Dry Ice Corp., 122½ Vermont Ave., Los Angeles, plans plant. $50,000.

Calif., San Francisco—PAINT MANUFACTURING PLANT—Glidden Co. of California, 1300 7th St., plans additions to present plant, 7th and Daggett Sts. To exceed $40,000 with equipment. T. Ronneberg, Crocker Bldg., engr.

Calif., San Jose—ICE PLANT, etc.—San Jose Ice & Cold Storage Co., 10 Center St., plans rebuilding ice and cold storage plant, destroyed by fire. $75,000 loss.

Colorado — MINING DEVELOPMENT — El Crest Mining Co., c/o H. A. Moore, pres., Colorado Springs, plans mining development in various locations. To exceed $100,000.

Colo., Mances — GOLD MINING — Navajo Gold Mines, Inc., c/o F. R. Holmes, pres., Danville, Ill., plans gold mining development in vicinity of here. To exceed $60,000.

Conn., Bridgeport—PLANT—Bryant Electric Co., 1421 State St., plans by F. Thompson, archt. and engr., 1336 Fairfield Ave., plant addition, Weaver Ave. $75,000.

Conn., Bridgeport—SERVICE STATION—R. Voccola, 1320 East Main St., plans by P. P. Petrofsky, 955 Main St., brick, steel automobile service station, East Main and Barnum Sts. $40,000.

Fla., Fort Pierce — PLANT — Fort Pierce Growers Assn. plans modern packing plant, 400,000 box capacity. $100,000. Lease for 99 years signed.

Ill., Chicago—STORAGE—Federal Pipe & Service Co., 900 South Campbell Ave., plans by Graham, Anderson, Probst & White, 80 East Jackson Ave., storage addition. $50,000.

Ill., Chicago—SHOP, etc.—International Harvester Co., 606 South Michigan Ave., plans shop and service station, Logan and Elston Aves. To exceed $45,000.

Ill., Chicago—LAUNDRY—Pullman Linen & Towel Supply Co., 11342-48 Front St., plans by Andrew F. Hughes, 7012 Egglestone Ave., 3 story, basement, 100x131 ft. laundry, 11342-48 Front St. $250,000.

Ill., Lawndale—STORAGE GARAGE, etc.—Corporation, c/o Mercantile Motor Sales, lessee, 3948 West Roosevelt Rd., plans altering and repairing storage garage and distribution building, West Roosevelt Rd. To exceed $38,000. Architect not appointed.

Ill., Rochelle—CANNING PLANT—Rochelle Asparagus Co. plans canning plant addition. $37,000 with equipment.

Ind., Indianapolis—PLANT—Basca Mfg. Co., 1454 East 19th St., former Houdaille-Hershey Co. plant, plans altering and equipping 3019 Roosevelt Ave. $37,000 with equipment.

Ind., Indianapolis—PLANT—Fairbanks Morse & Co., 900 South Wabash Ave., Chicago, Ill., plans plant improvements, 21st St. and Northwestern Ave. $60,000.

Ky., Lexington — PLANT — Kentucky Independent Packing Co. plans addition to former Munn Bros. Co. plant. $100,000.

La., New Orleans—FACTORY—Frank Dantoni & Co., Gallatin St., plans by Sam Stone, Jr., and Co., Masonic Temple Bldg., New Orleans, remodeling 4 story, 26x90 ft., brick building into macaroni factory. **Noted May 2, C.D.**

Me., Lewiston — STORAGE DISTRIBUTION, etc.—F. W. Woolworth Co., 233 Bway., New York, plans storage distribution and store alterations, and rebuilding. To exceed $50,000.

Me., Waterville—TERMINAL, etc.—Fairfield Oakland Electric R.R., Waterville, plans terminal, service and storage. To exceed $45,000. **Maturity indefinite.** Architect not appointed.

Md., Baltimore — PLANT — Owens Illinois Glass Co., 965 Wall St., Toledo, O., plans improvements to tin decorating factory, recently acquired, Boston St. and Linwood Ave. To exceed $40,000. Architect not appointed.

Mass., Chelsea—STORAGE PLANT—Ipamco Pipe Corp., 32 Liberty St., New York, F. D. Pavey, pres., plans 2½ m.g. oil storage plant. To exceed $100,000.

Mass., Lee—FACTORY—Smith Paper Co., Inc., Mill St., soon lets contract 1 story, basement, 146x161 ft. and 130x130 ft., factory, saw tooth roofs, machine piers, reinforcing steel, structural steel and brick machine unit and finishing plant. To exceed $37,000. Private plans.

Mass., Malden—PLANT—Continental Can Co., 100 East 42nd St., New York, plans plant. To exceed $100,000. J. Fedasky, 100 East 42nd St., New York, in charge.

Mass., Salem — PLANT — Hygrade-Sylvania Corp., Boston and Bridge Sts., plans radio tube plant, Loring Ave., South Salem. Est. $250,000. Lockwood Greene & Co., 30 Rockefeller Plaza, New York, engrs.

Mich., Alma—OIL REFINERY—Century Refining Co., Alma, plans crude oil refinery on site acquired. $65,000. **Maturity in spring.** Company's own staff, engr.

Mich., Grand Rapids—OIL REFINERY—State Refining Co., Inc., Grand Rapids, plans 1,000 bbl. capacity crude oil refinery. $75,000. **Maturity soon.** Private plans.

Mich., Manistee—PLANT—Rudemaker Chemical Co. plans alterations and improvements to plant. $75,000.

Miss., Greenwood—LUMBER PLANT—T. E. Gwin Lumber Co., Greenwood, plans lumber

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†*Federal Government*

Industrial Buildings (Continued)

plant. $37,000 with equipment. **Maturity indefinite.** Architect not appointed.

Miss., Picayune — FACTORY — Pearl River Corp., plans by Krouse & Brasefield, Meridian, 180x275 ft. rein.-con., steel brick manufacturing plant.

N. J., Newark—FACTORY—Conte Casket Co., 280 Pleasant Ave., New York, plans altering casket factory, McClellan St. $37,000 or more with equipment.

N. J., Somerville—PLANT—Majestic Fur Dressing & Dyeing Co., West Main St., plans repairing and altering fire damaged plant, West Main St. $37,000 with equipment. Architect not appointed.

N. Y., Buffalo — PLANT — Colonial Radio Corp., 254 Rano St., plans plant addition. $40,000.

N. Y., Buffalo—FACTORY—Trico Products Corp., 817 Washington St., plans by W. R. Jewel, 33 Frontenac Ave., Buffalo, 5 story, basement factory, Washington St. To exceed $105,000.

N. Y., Long Island City—WAREHOUSE—Aronaut Realty Corp., Detroit, Mich., plans by A. Kahn, Detroit, Mich., 1 story, 200x282 ft., brick, 30th Dr. near 12th St. $80,000.

N. Y., Long Island City — PLANT — Hodes Zink Co., H. E. Zink, in charge, Fremont, O., plans altering and equipping branch plant. $37,000 with equipment.

N. Y., New York—STORAGE—Public National Bank & Trust Co., 76 William St., plans by Schwartz & Gross, 347 5th Ave., 2 story storage and showroom, 89 Delancy St. $45,000.

N. Y., New York—FACTORY—Schieren Realty Corp., 30 Ferry St., plans by F. P. Kelley, c/o owner, altering 5 story factory, 82 Beekman St. $37,000 with equipment.

N. Y., New York—GARAGE, etc.—Stonedale Realty Corp., 565 5th Ave., plans by Moore & Landsiedel, 3rd Ave. and 48th St., 1 story, 50x100 ft., garage and storage, 422 West 29th St. $50,000.

N. Y., New York—STORAGE, etc.—Gerry Estates, Inc., 270 Bway., plans by J. B. Snook & Sons, 299 Bway., altering 8 story, storage and distribution system, 1110 6th Ave. $80,000.

N. Y., New York—GARAGE—American Re-Insurance Co., 99 John St., plans by M. Whinston, 110 West 40th St., altering 4 story garage, 180 Wooster St. $37,000 with equipment.

N. Y., New York—GARAGE, etc.—Dpt. Parks, Arsenal Bldg., Central Park, New York, plans by A. Embury, 2nd c/o owner, 1 story, 65x72 ft, garage and service building, Bennett Ave. and Bway. $40,000.

N. Y., New York—FACTORY, etc.—A. A. Russell, 22 William St., plans by R. Teichman, 115 Broad St., altering factory and loft, 533 Bway. $37,000 with equipment.

N. C., Burlington — GAS PLANT — Duke Power Co., C. E. Scott, in charge, plans gas plant additions. $37,000 with equipment.

O., Akron—SHOP, etc.—U. S. Stoneware Co., 50 Church St., New York, plans shop, power plant and factory addition, here. $40,000 or more.

O., Cincinnati—FACTORY—Century Machine Co., 4434 Marburg Ave., plans by Tietig & Lee, 34 West 6th St., factory. $37,000 with equipment.

O., Cincinnati—BOTTLING PLANT—O. H. Bardon, archt., 1626 Shenandoah St., soon takes bids 2 story, basement, 67x105 ft., brick, concrete, plain found., Reading Rd., for Vianna Brewing Co., Sycamore St. $50,000.

O., Mansfield—PLANT—Empire Sheet & Tin Plate Co. plans plant addition. $300,000.

Okla., Oklahoma City—GAS BOOSTER STATION—Barnsdell Oil Co., Tulsa, preliminary plans made constructing natural gas booster pump station, 36th and Lottie Sts. $35,000. Private plans.

Ore., Portland—PLANT—Sprouse-Reitz Co., 1900 West 22nd St., soon takes bids constructing 1 story, 100x150 ft. plant, steam heating, automatic sprinkler protection, etc., Northwest 22nd St. F. M. Stokes, Terminal Sales Bldg., completed preliminary plans.

Pa., Brackenridge — TERMINAL — Allegheny Steel Co., Brackenridge, plans barge loading terminal at plant on Allegheny River. To exceed $50,000. Site acquired.

Pa., Pittsburgh — PLANT — Owens-Illinois Glass Co., 965 Wall St., Toledo, O., plans improvements to plant of Enterprise Can Co., recently acquired, Chambers St. To exceed $40,000. Architect not appointed.

S. C., Union—FOUNDRY—Union Iron Fdry. Co. plans foundry. $37,000 with equipment. Architect not appointed.

Tex., Galveston—PLANT—Eastern States Petroleum Co., Inc., Galveston and Petroleum Bldg., Houston, plans modern cracking plant on channel between Galveston and Houston. $300,000. Engineer, c/o owner, engr.

Va., Salem — PACKING PLANT — Neuhoff Inc., Lynchburg, plans packing plant, Norfolk and Western R.R. tracks. $100,000.

Wash., Tacoma—BOTTLING PLANT—E. J. Bresemann, archt., Perkins Bldg., soon lets contract 3 story, 42x170 ft., rein.-con., bottling plant and cellar unit, 2120 South C St., for Columbia Breweries, Inc., 2120 South C St. $120,000.

Wis., Milwaukee—GARAGE—Owner, c/o E. Johnson & H. Grasshold, archts., 783 North Jefferson St., soon takes bids 1 story, 72x90 ft., brick, steel garage, plain found., North Cass St.

B. C., Nelson—CREAMERY—Curley Creamery Co., D. D. Townsend, genl. mgr., making plans constructing new creamery building, Hall St. $40,000.

N. B., Grand Falls—MINING DEVELOPMENT—Sheelite Mining Syndicate announces early start of Tungsten mining operation in New Brunswick. $50,000.

Ont., Hamilton—PLANT—United Carr Fastener Co., H. S. Beddoe, mgr., Gage Ave. N., plans 1 story, 45x60 ft., brick, steel addition to plant. Additional special equipment for manufacturing patent fasteners to be installed.

Ont., Sault Ste. Marie — MILL — Chromium Mining & Smelting Corp., 6 James St. S., Hamilton, A. R. Globe, pres., plans enlarging 2 electric furnaces and constructing 1 new one, also building transformer house and new ore bins. Noted Jan. 20, C.D.—Jan. 23, E.N.-R.

★ **Que., Three Rivers**—GRAIN ELEVATOR—E. D. Howe & Co. Ltd., engrs., P. Utilities Bldg., Port Arthur, soon lets contract constructing 2,000,000 bu. rein.-con. grain elevator, for Three Rivers Grain & Elevator Co. Ltd., c/o Toronto Elevators Ltd., Queens Quay, Toronto, Ont. $700,000.

BIDS ASKED

Calif., Los Angeles—MARKET—J. Schenck, United Artists Studios, 1041 North Hermosa St., taking bids 1 and 2 story, 127x186 ft., rein.-con., steel, 6th and Vermont Sts. $75,000. Walker & Eisen, 708 Pacific Commerce Bldg., archts. Noted Dec. 24, C. D.—Jan. 2, E. N.-R.

Ill., Alton—STEEL ROD MILL—See "Contracts Awarded."

Mich., Detroit—FACTORY—See "Contracts Awarded."

Conn., Bridgeport—FACTORY—Hemco Moulding Div., Bryant Electric Co., 1421 State St., H. E. Seim, genl. mgr., taking bids 1 story, 90x200 ft., brick, steel factory unit, electric steel welding, Railroad Ave. $80,000. Fletcher-Thompson, Inc., 1336 Fairfield Ave., archts. Noted Jan. 2, C. D.—Jan. 9, E. N.-R.

Mass., Roxbury — BREWERY, etc. — Star Brewing Co., 69 Shirley St., taking bids 2 story, basement, 65x105 ft., brick brewery addition and alteration, concrete found. To exceed $37,000. E. Hartman, North Middleboro, archt.

N. Y., Buffalo—FACTORY—Feb. 7, by Trico Products Co., 817 Washington St., general contract plumbing, heating, electrical work, structural steel, boiler and smokestack, for 92x134 ft., brick, steel factory, plain found., Washington St. $105,000. W. R. Jewel, 33 Frontenac Ave., archt. Noted Jan. 17, C. D.—Jan. 23, E. N.-R.

N. Y., New York—GARAGE, etc.—G. D. Glass, 33-60 190th St., Flushing, taking bids general contract garage and shop, 426 West 29th St. $37,000. P. Markowitz, 5 Beekman St., archt.

N. Y., New York—GARAGE—See "Contracts Awarded."

O., Cleveland—GARAGE—See "Contracts Awarded."

R. I., Providence — FRUIT PRODUCE — F. Chiaverini, archt., 32 Broadway, taking bids 1 story, 30x270 ft., brick, steel, concrete found., Hemlock and Valley Sts., for Governor Dyer Market Assoc., c/o Architect. $50,000. Noted Dec. 9, C. D.

Ont., St. Catherines—FOUNDRY—Feb. 3, by McKinnon Industries Ltd., Ontario St., constructing 1 story, 300x322 ft., brick, steel foundry unit, plain found., Ontario St. $150,000. A. E. Nicholson, 46 Queen St., archt. Noted Dec. 20, C. D.—Dec. 23, E. N.-R.

CONTRACTS AWARDED

Calif., Napa—FACTORY—W. W. Hanscom, engr., 848 Clayton St., San Francisco, 1 story, 100x400 ft concrete factory, Soscol Ave., for Rough Rider Mfg. Co., 175 12th St., San Francisco, to P. J. Walker Co., Sharon Bldg., San Francsico, about $50,000. Awarded Jan. 13.

Calif., Salinas — ICE MANUFACTURING PLANT—Salinas Valley Ice Co., 120 tons per day capacity ice manufacturing plant, rein.-con., East Gabilan and Griffin Sts., to W. E. Greene, 32 Willow St., about $100,000. Private plans. Awarded Jan. 13.

Calif., San Francisco—TERMINAL, etc.—Redline Transfer Co., 1465 Folsom St., steel frame and corrugated iron, concrete loading platforms, etc., for motor truck terminal and shops, Brannan St. near 6th St., to Barrett & Hilp, 918 Harrison St. $40,000. Ellison & Russell, Pacific Bldg., engrs.

Calif., Sausalito — WAREHOUSE — American Distilling Corp., 160x200 ft., rein.-con., brick, tile, bonded warehouse, to Leibert & Trobock, Albert Bldg., San Rafael, fixed fee basis. Awarded Jan. 14. Noted Nov. 27, C.D.—Dec. 5, E.N.-R.

★ **Calif., Southgate** — PLANT — Albert Kahn, archt., Central Bldg., Detroit, Mich., constructing auto assembly plant covering 43 acres, consisting of several buildings, Tweedy Blvd., for General Motors, Inc., Central Bldg., Detroit, Mich., to J. A. Utley, 6031 Mansur St., Detroit, Mich. Est. $2,500,000. Bids Jan. 13, awarded Jan 22.

Conn., Hartford—FACTORY—Allyn Wadhams Co., general contractors, 15 Lewis St., electrical work for 4 story factory, Orange and Arbor Sts., for Underwood Elliott Fisher Co., 410 Asylum St., to Baldwin Stewart Electric Co., 222 Pearl St.•••heating, plumbing, sprinkler, to Thomas G. Shaffer, Inc., 49 Pearl St.••• limestone, to Kelly Bros., Charter Oak Ave.••• structural steel-iron, to Standard Structural Steel Co., 1044 Wethersfield Ave. Noted Jan. 14, C. D.—Jan. 16, E. N.-R., under "Contracts Awarded."

Idaho, Twin Falls—BEET SUGAR FACTORY—Amalgamated Sugar Co., c/o American Crystal Sugar Co., Denver, Colo., repairs and betterments to beet sugar factory, day labor and separate contracts awarded. Est. about $37,000 with equipment.

Ill., Alton — STEEL ROD MILL — Laclede Steel Co., Alton, constructing steel rod mill, separate contracts. To exceed $100,000.

Ill., Chicago—PLANT—Liquid Carbonic Corp., 3100 South Kedzie St., general contract plant addition, to Kaiser Ducett Co., 80 East Jackson St. Est. $40,000 or more.

Ill., North Chicago—PLANT—Brevolite Lacquer Co., 20th St. and Sheridan Rd., plant addition, to Campbell, Lourie & Lautermilch, 400 West Madison Ave., Chicago. Est. $50,000.

Md., Baltimore — FILLING STATION — Gulf Refining Co., 1500 Locust St., Phila., Pa., 1 story filling stations at Highland Ave. and Phila. Rd., Woodbourne Ave. and York Rd., Bloomingdale Rd. and Ellamont, 609 Frederick Rd., Catonsville, North Ave. and Aisquith St., to Avon Constr. Co., 216 East Lexington St., $120,000. Bids Jan. 10. Noted Jan. 8, C. D.—Jan. 16, E. N.-R.

Mich., Detroit — FACTORY — Wayne Screw Products Co., 521 Jean St., factory, 521 Jean St., separate contracts. $37,000 with equipment. H. Angell, 227 East Philadelphia St., archt.

N. Y., New York—GARAGE—McComb Estates Corp., 7 Hanover St., constructing garage and shop, 522 West 21st St., separate contracts, $37,000 or more. Private plans. Noted Dec. 27, C. D.—Jan. 2, E. N.-R.

N. Y., New York—STORAGE—National Fire Marine Insurance Co., 111 William St., 4 story, brick storage, 23 Cliff St., to G. Richard Davis & Co., 12 East 41st St. Est. $60,000. Noted Dec. 31, C. D.—Jan. 9, E. N.-R.

N. Y., Syracuse — PLANT — General Motors Corp., General Motors Bldg., Detroit, Mich., reconditioning plant, day labor and separate contracts. To exceed $40,000 with equipment.

O., Cincinnati — RADIO TOWER — Crosley Radio Corp., 1329 Arlington Ave., constructing radio tower and transmission building, to Ferro Concrete Constr. Co., 203 West 3rd St. Noted Dec. 2, C. D.—Dec. 5, E. N.-R.

O., Cincinnati—BOTTLING PLANT—Schoenling Ice & Fuel Co., 1624 Central Ave., 2 story, basement, 16x161 ft., brick, concrete bottling plant, on Central Ave., to Ferro Concrete Constr. Co., 3rd and Elm Sts. Est. $40,000. Noted Feb. 4, C. D.—Feb. 7, E. N.-R.

O., Cleveland—FACTORY—J. C. Virden Light Fixture Co., J. C. Virden, pres., 6001 Longfellow Ave., 2 story, 50x152 ft. factory addition, to A. M. Higley Co., 2036 East 22nd St. Est. $40,000.

O., Cleveland—GARAGE—J. W. Smith, 2504 Fairmount Blvd., service garage on Euclid Ave. and Mayfield Rd., separate contracts. $37,000 with equipment. W. R. Powell, Rose Bldg., archt.

Ore., Portland — PLANT — Union Oil Co. of California, Yeon Bldg., constructing bulk storage plant, separate contracts, tanks, to Steel Tank & Pipe Co. of Oregon, 518 Northeast Columbia Blvd. Est. about $37,000 with equipment.

Pa., Pittsburgh—PACKING PLANT—Wilson & Co., 1147 Pennsylvania Ave., alterations and new building to packing plant, 12th and Pike Sts., to Edward Crump Jr., 4031 Bigelow Blvd. Est. $40,000. Noted Dec. 2, C. D.—Dec. 5, E. N.-R.

Wash., Salkum — SAWMILL — Chehalis Mill Co. rebuilding mill destroyed by fire. $100,000. Owner builds.

Wash., Seattle — PLANT — Continental Can Co., 615 Orchard St., constructing 3 story, 120 x150 ft., rein.-con. addition, to Austin Co., Horton Bldg., $110,000. Noted Dec. 31, C. D.—Jan. 9, E. N.-R.

Wash., Tacoma — BREWERY — Columbia Brewing Co., 2140 C St., 3 story, 42x170 ft. brewery addition, to J. W. Bailey Constr. Co., 2140 South C St. Est. $45,000.

Wis., Milwaukee—FACTORY—Monarch Tool & Die Wks., 815 West Juneau St., excavation, masonry, cut stone for 1 story, 52x120 ft., brick, concrete factory, North Fratney St., to C. Salb Constr. Co., 2045 North 49th St.; steel sash, steel roof deck, to Truscon Steel Co., 238 West Wisconsin Ave. M. Pfoller, 8525 Ravenswood Circle, Wauwatosa, archt.

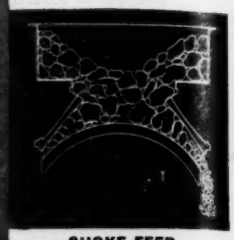
Ont., Copper Cliff—SMELTER—International Nickel Co. of Canada, Ltd., constructing rein.-con. chimney 500 ft. high, to Custodis Canadian Chimney Co., Ltd., 600 St. Catherines St. W. Montreal, Que. Noted Jan. 14, C.D.—Jan. 16, E.N.-R., under "Contracts Awarded."

†*Federal Government.*

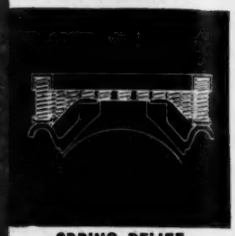
GREATER TONNAGE *and a* MORE CUBICAL PRODUCT

● Not only does the Telsmith Gyrasphere increase tonnage . . . it turns out a more cubical aggregate which makes stronger concrete and better road material. The reasons—outstandingly superior features of Telsmith design.

❶ CHOKE FEED—Fill the hopper up with rock . . . cover it up . . . pile it deep . . . Telsmith takes an unregulated choke feed. That means steady, reliable, economic, effective reduction capacity. ❷ SPRING RELIEF—Springs relieve momentary packing and compensate for uncrushable material in the crushing chamber . . . allow finer adjustment. ❸ SPHERICAL HEAD and corresponding concave crush like an inverted mortar and pestle . . . rock being caught and broken between two multi-curved surfaces . . . causing an ideal cubing action. The spherical shape of the crushing head greatly reduces the lateral pressures, thereby relieving the load on the bronze eccentric sleeves. Diverted *downward* a large part of the load is concentrated on ❹ THE ROTARY HEAD SUPPORT and roller thrust bearings. Head and shaft are supported on the eccentric by means of the upper roller thrust bearing while the downward pressures are transmitted to the frame by the lower roller thrust bearing (see sectional view) which supports the shaft. As both bearings rotate, wear is uniform and supporting surfaces are always perfectly aligned—shaft breakage is eliminated, eccentric bearings last longer.



❶ CHOKE FEED



❷ SPRING RELIEF

❸ SPHERICAL HEAD

❹ ROTARY HEAD SUPPORT

WRITE FOR BULLETIN Y-2

SMITH ENGINEERING WORKS

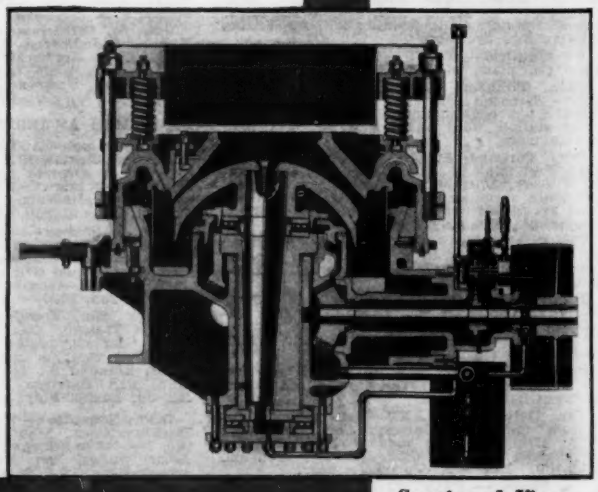
500 E. CAPITOL DRIVE, MILWAUKEE, WIS.

Cable Addresses: Sengworks, Milwaukee • Concrete, London

Associates in Canada: Canadian Ingersoll-Rand Co., Ltd.
Montreal, Toronto, Winnipeg, Vancouver

50 Church St. New York City	201 N. Wells Chicago, Ill.	1013 Commercial Trust Bldg. Philadelphia, Pa.
605 Statler Bldg. Boston, Mass.	412 Westinghouse Bldg. Pittsburgh, Pa.	Brandeis M. & S. Co. Louisville, Ky.
L. V. Fraley & Son St. Louis, Mo.	Milburn Mchy. Co. Columbus, Ohio	Thomas G. Abrams Detroit, Mich.
Choctaw C. & M. Co. Memphis, Tenn.	V. L. Phillips Co. Kansas City, Mo.	V. L. Phillips Co. Oklahoma City, Okla

Y-8



Sectional View of Telsmith Gyrasphere Crusher

TELSMITH GYRASPHERE

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